

ZOOLOGY  
OF THE  
BEAGLE

PART 1.  
FOSSIL  
MAMMALIA.

PART 2.  
MAMMALIA.

1839-40







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Zoology



THE  
ZOOLOGY  
OF  
THE VOYAGE OF H.M.S. BEAGLE,  
UNDER THE COMMAND OF CAPTAIN FITZROY, R.N.,  
DURING THE YEARS  
1832 TO 1836.

PUBLISHED WITH THE APPROVAL OF  
THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

Edited and Superintended by  
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NATURALIST TO THE EXPEDITION.

PART I.  
FOSSIL MAMMALIA:

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P R E F A C E.

HIS MAJESTY'S ship, *Beagle*, under the command of Captain FitzRoy, was commissioned in July, 1831, for the purpose of surveying the southern parts of America, and afterwards of circumnavigating the world. In consequence of Captain FitzRoy having expressed a desire that some scientific person should be on board, and having offered to give up part of his own accommodations, I volunteered my services ; and through the kindness of the hydrographer, Captain Beaufort, my appointment received the sanction of the Admiralty. I must here, as on all other occasions, take the opportunity of publicly acknowledging with gratitude, the obligation under which I lie to Captain FitzRoy, and to all the Officers on board the *Beagle*, for their constant assistance in my scientific pursuits, and for their uniform kindness to me throughout the voyage. On my return (October, 1836) to England, I found myself in possession



of a large collection of specimens in various branches of natural history; but from the great expense necessary to secure their publication, I was without the means of rendering them generally serviceable.

The Presidents of the Linnean, Zoological, and Geological Societies, having given me their opinion respecting the utility to be derived from publishing these materials, I addressed a letter to the Right Honourable the Chancellor of the Exchequer (T. Spring Rice, Esq.) informing him of the circumstances under which I hoped that I might venture to solicit the aid of Government. In reply, I received a communication (as below) announcing to me that the Lords of the Treasury, from their readiness to promote Science, were willing, under certain conditions, to give me the most liberal assistance.

*"Treasury Chambers, August 31, 1837.*

"SIR,

"It having been represented to the Lords Commissioners of Her Majesty's Treasury, from various quarters, that great advantage would be derived to the Science of Natural History, if arrangements could be made for enabling you to publish, in a convenient form, and at a cheap rate, the result of your labours in that branch of science, my Lords will feel themselves justified in giving their sanction to the application of a sum, not exceeding in the whole one thousand pounds, in aid of such a publication; upon the clear and distinct understanding that the Work should be published, and the plates engraved, in such a manner as to be most advantageous to the Public at large, upon a plan of arrangement to be previously submitted to, and sanctioned by the Board, after consultation with those persons, who, from their attainments

in this branch of science, are the most capable of advising their Lordships thereupon; and that the payments on account of the said sum of one thousand pounds are to be made to you from time to time, on a certificate that such progress has been made in the engravings, in accordance with the plan previously approved of, as to justify the issue then applied for. My Lords have therefore directed me to communicate to you the views they entertain upon this subject; and to apprise you that they will be prepared to act in conformity with their arrangement, upon learning from you that you are ready to proceed with the Work upon the principles above laid down, and upon receiving from you a statement of the manner in which you think the Work should be published, and the plates engraved, so as most effectually to accomplish the object my Lords have in view, in sanctioning the payment from the Public Funds, in aid of the expenses of the Work in question.

"I remain,

"Sir, Your Obedient Servant,

"A. Y. SPEARMAN."

The object of the present Work is to give descriptions and figures of undescribed and imperfectly known animals, both fossil and recent, together with some account, in the one case, of their geological position, and in the other of their habits and ranges. As I do not possess the knowledge requisite for such an undertaking, and as I am, moreover, particularly engaged in preparing an account of the geological observations, made during the voyage, several gentlemen have most kindly undertaken different portions of the Work. Besides the very great advantage insured in thus enlisting the attainments of these Naturalists in the several departments of science, to which they have paid most



attention, a great delay is avoided by adopting this method of publication, which must otherwise have been incurred before the materials could have been made known.

An Account of the Voyage, drawn up by Captain FitzRoy, (and to which I have added a volume) being on the point of publication, I shall not in this Work enter on any minute details respecting the countries which were visited, but shall merely give a sketch of the geology in the introduction to the part containing Fossil Mammalia, and a brief geographical notice in that attached to the account of existing animals. At the conclusion of this Work, I shall endeavour to place together the leading results in the natural history of the different countries, from which the collections were procured. I may here state that Mr. Owen has undertaken the description of the Fossil Mammalia; Mr. Waterhouse, the Recent Mammalia; Mr. Gould, the Birds; Mr. Bell, the Reptiles; and the Rev. L. Jenyns, the Fish. Whatever assistance I may obtain in the invertebrate classes, will be noticed in their respective places. The specimens have been presented to the various public museums, in which it was thought they would be of most general service: mention will be made in each part where the objects described have been deposited.

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## GEOLOGICAL INTRODUCTION.

BY MR. DARWIN.

Mr. OWEN having undertaken the description of the fossil remains of the Mammalia, which were collected during the voyage of the Beagle, and which are now deposited in the Museum of the College of Surgeons in London, it remains for me briefly to state the circumstances under which they were discovered. As it would require a lengthened discussion to enter fully on the geological history of the deposits in which these remains have been preserved, and as this will be the subject of a separate work, I shall here only give sufficient details, for the reader to form some general idea of the epoch, at which these animals lived,—of their relative antiquity one to the other,—and of the circumstances under which their skeletons were embedded. All the remains were found between latitudes 31° and 50° on the eastern side of South America. The localities may conveniently be classed under three divisions, namely—the Provinces bordering the Plata; Bahia Blanca situated near the confines of Northern Patagonia; and Southern Patagonia.

The first division includes an enormous area, abounding with the remains of large animals. To the eastward and southward of the great streams, which unite to form the estuary of the Plata, those almost boundless plains extend, which are known by the name of the Pampas. Their physical constitution does not vary over a wide extent;—the traveller may pass for many hundred miles on a level surface, without meeting with a single pebble, or discovering any change in



the nature of the soil. The formation consists of a reddish argillaceous earth, generally containing irregular concretions of a pale brown, indurated marl. This stone, where most compact, is traversed by small linear cavities, and in several respects resembles the less pure fresh-water limestones of Europe. The concretions not unfrequently become so numerous, that they unite and form a continuous stratum, or even the entire mass.

At Bajada de St<sup>a</sup>. Fé, in the Province of Entre Rios, beds of sand, limestone, and clay of different qualities, containing sharks' teeth and sea-shells, underlie the Pampas deposit. The shells, although numerous, are few in kind. Mr. George B. Sowerby informs me that they appear to belong to one of the less ancient tertiary epochs; they consist of *Venus* nov. spec. near to *V. cancellata*; *Arca* nov. spec. near to *A. antiquata*; a very large oyster, probably an extinct species; an imperfect specimen of a second species of oyster near to *O. edulis*; and a *Pecten* near to *P. opercularis*. These beds pass upwards into an indurated marl, and this again into the red argillaceous earth of the Pampas, containing the remains of those extinct quadrupeds, which every where characterize that deposit. To the southward of the Plata level plains of an uniform composition, interrupted only at wide intervals by hills of crystalline rock, extend to a distance of about three hundred miles; and to the northward for at least an equal space, and probably much further. As might have been expected from the perfectly level surface, wherever a continuous section is presented on the banks of the great rivers, very slight changes of colour show, that the deposit has been accumulated in strata as horizontal as the land, or as the water-line at the base of the cliffs.

In the province of Banda Oriental (to the N. and N. E. of the Plata), and in part of that of Entre Rios, the land, though very low and level, has a foundation of granitic and other primary rocks. These older formations are partially covered, in most parts, by a reddish earthy mass containing a few small calcareous concretions; while in other parts, they are concealed by more regular strata, of indurated marl passing into limestone, of conglomerates, and ferruginous sandstone. The entire formation probably belongs to the same epoch with that of the Pampas deposit. In the earthy mass, even where it is of little thickness, and where it might readily be mistaken for detritus produced from the underlying granites, remains of large quadrupeds have several times been discovered.

On the shores of the Plata and in the neighbouring districts, proofs of a change of level having taken place between the land and the water within a recent period, may be observed. Both near Monte Video and Colonia del Sacramento, beds of shells are lying on the beach at the height of several feet above the present tidal action. Near Maldonado I saw estuary shells of recent species embedded in clay, and raised above the level of a neighbouring fresh-water lake.

On the banks of the Parana, a shell identical with, or most closely resembling an estuary species (*Potamomya labiata*, now living in that part of the Plata, where the water is brackish) is accumulated in great masses, which are found some miles inland, and are elevated several yards above the level of the river. Sir Woodbine Parish, also, has in his possession, shells procured from an extensive formation near Ensenada de Barragan (south of Buenos Ayres), which is quarried for lime. Mr. George Sowerby has examined these fossils, and says the following are identical with living kinds; *Voluta colocynthis*, Dillwyn: *V. angulata*, Swainson: *Buccinum globulosum*, Kiener: a variety of *Oliva patula*: a *Cytheræa* closely resembling or identical with *C. flexuosa*, and a fragment of a second species, probably *C. purpurascens*; *Potamomya labiata*; and fragments of oysters. There is, however, a species of *Macra* in very great numbers, with which Mr. Sowerby is wholly unacquainted. I may observe that I found recent shells of the first five species inhabiting the coast, a short distance to the southward. Some shelly limestone from the same place, which Sir Woodbine Parish had the kindness to show me, resembles that which I saw at Bajada, and in Banda Oriental. These beds, therefore, probably form parts of the Pampas deposit, and are not merely indicative of the period of its elevation. Nevertheless, on the opposite shores of the Plata, near the mouth of the Uruguay, I found lines of sand dunes, where the *Macra* and *Cytheræa flexuosa* were lying in such quantities on the bare surface, that the inhabitants, by merely sifting the sand, collect them for burning into lime.

After these facts we may feel certain, that at a period not very remote, a great bay occupied the area both of the Pampas and of the lower parts of Banda Oriental. Into this bay the rivers which are now united in the one great stream of the Plata, must formerly have carried down (as happens at the present day) the carcasses of the animals, inhabiting the surrounding countries; and their



skeletons would thus become entombed in the estuary mud which was then tranquilly accumulating. Nothing less than a long succession of such accidents can account for the vast number of remains now found buried. As their exposure has invariably been due to the intersection of the plain by the banks of some stream, it is not making an extravagant assertion, to say, that any line whatever drawn across the Pampas would probably cross the skeleton of some extinct animal.

At Bajada, a passage, as I have stated, may be traced upwards from the beds containing marine shells, to the estuary mud with the bones of land animals. In another locality a bed of the same mineralogical nature with the Pampas deposit, underlies clay containing large oysters and other shells, apparently the same with those at Bajada. We may, therefore, conclude that at the period when the Arca, Venus, and Oyster were living, the physical condition of the surrounding country was nearly the same, as at the time when the remains of the mammalia were embedded; and therefore that these shells and the extinct quadrupeds probably either co-existed, or that the interval between their respective existences was, in a geological point of view, extremely short. In this part of South America there is reason to believe that the movements of the land have been so regular, that the period of its elevation may be taken as an element in considering the age of any deposit. The circumstance, therefore, that the beds immediately bordering the Plata, contain very nearly the same species of molluscs, with those now existing in the neighbouring sea, harmonizes perfectly with the more ancient (though really modern) tertiary character of the fossils underlying the Pampas deposit at Bajada, situated at a greater height, and at a considerable distance in the interior. I feel little doubt that the final extinction of the several large quadrupeds of La Plata did not take place, until the time when the sea was peopled with all, or nearly all, its present inhabitants.

Bahia Blanca, situated in latitude  $39^{\circ}$ , and about 250 miles south of the Plata, constitutes the second district, in which I found the remains of quadrupeds. This large bay is nearly surrounded by very low land, on which successive lines of sand dunes mark in many parts the retreat of the water. At some distance inland a formation of highly indurated marl, passing into limestone, forms an escarpment. Beyond this, rocks of the same character extend over a wide and

desolate plain, which rises towards the flanks of the distant mountain of the Sierra de la Ventana, composed of quartz. On the low shores of this bay, only two places occur, where any section of the strata can be seen; and at both of these I found fossil remains.

At Monte Hermoso, a line of cliff of about 120 feet in height, consists in the upper part of a stratum of soft sandstone with quartz pebbles; and in the lower of a red argillaceous earth, containing concretions of pale indurated marl. This lower bed has the same mineralogical character with the Pampas deposit; and possibly may be connected with it. The embedded bones were blackened, and had undergone more chemical change than in any other locality, which I examined. With the exception of a few large scattered bones, the remains seemed to belong chiefly to very small quadrupeds.

In another part of the bay, called Punta Alta, about eighteen miles from Monte Hermoso, a very small extent of cliff, about twenty feet high, is exposed. The lower bed seen at ebb tide, extends over a considerable area; it consists of a mass of quartz shingle, irregularly stratified, and divided by curved layers of indurated clay. The pebbles are cemented together by calcareous matter, which results, perhaps, from the partial decomposition of numerous embedded shells. In this gravel the remains of several gigantic animals were extraordinarily numerous. The cliff, in the part above high-water mark, is chiefly composed of a reddish indurated argillaceous earth; which either passes into, or is replaced by, the same kind of gravel, as that on which the whole rests. The earthy substance is coarser than that at Monte Hermoso, and does not contain calcareous concretions. I found in it a very few fragments of shells, and part of the remains of one quadruped.

From the bones in one of the skeletons, and likewise from those in part of another, being embedded in their proper relative positions, the carcasses of the animals, when they perished, were probably drifted to this spot in an entire state. The gravel, from its stratification and general appearance, exactly resembles that which is every day accumulating in banks, where either tides or currents meet; and the embedded shells are of littoral species. But from the skeleton, in one instance, being in a position nearly undisturbed, and from the abundance of serpulæ and encrusting corallines adhering to some of the bones, the water, at



the time of their burial, must have been deeper than at present. This conclusion might also have been inferred from the fact, that in the neighbouring cliff the same bed, with its shells, has been uplifted some yards above high-water mark. On the coast to the southward abundant proofs occur, of a recent elevation of the continent. In the gravel, nearly all the pebbles are of quartz, and have originally proceeded from the lofty range of the Ventana, distant between forty and fifty miles. Besides the pebbles of quartz, there are a few irregular masses of the same indurated marl, of which the escarpment of the neighbouring great plain is composed. Hence the gravel beds must have been deposited, when the plain existed as dry land; and on it probably those great animals once lived, of which we now find only the remains. The indurated marl forming the plain, is the same kind of rock with that occurring over a wide extent of the Pampas; and there is no reason to doubt, they are parts of one great formation. Nevertheless, the gravel bed of Bahia Blanca, although subsequent to the calcareous formation, may be of the same age with those parts of the Pampas, which stand at a low level near the Plata. For on this whole line of coast, I believe, as the land has continued rising, fresh littoral deposits have been formed; and each of these would often owe part of its materials to the degradation of the one last elevated.

With respect to the relative age of the Monte Hermoso and Punta Alta beds, it is not possible to speak decidedly. A certain degree of similarity in the nature of the strata containing quartz pebbles, and those of the reddish indurated earth; and the short distance between the two localities, would indicate that no long interval had intervened. The beds at Monte Hermoso, certainly were deposited more tranquilly, and probably in a deeper sea; so that even skeletons of animals, no larger than rats, have been perfectly preserved there. In some parts of the surrounding country, obscure traces of a succession of step-formed terraces may be observed; and each of these indicates a period of repose during the elevation of the land, at which time the strata previously existing were worn away, and fresh matter deposited. The Monte Hermoso beds were, perhaps, formed during one such interval, anterior to the accumulation of the shingle bank at Punta Alta.

Mr. G. Sowerby, who has been good enough to examine the shells which were found with the remains of the quadrupeds, has given me the following list.

1. <i>Voluta angulata</i> .	12. <i>Assiminia</i> (?) Minute species, identical with one living in the bay.
2. — <i>colocynthis</i> .	13. <i>Bulinus nucleus</i> .
3. <i>Oliva Brasiliensis</i> .	14. <i>Fissurella</i> Probably same as a kind ( <i>nov. spec.</i> ?) living in the bay.
4. — Nearly related to <i>O. patula</i> , but specimen imperfect.	15. <i>Crepidula muricata</i> .
5. — Nearly related to <i>O. oryza</i> ; less nearly to small species now living at Bahia Blanca.	16. — <i>Nov. spec.</i>
6. — <i>Nov. spec.</i>	17. <i>Cytherea</i> Closely related to, or identical with <i>C. purpurascens</i> .
7. <i>Buccinum cochlidium</i> .	18. <i>Modiola</i> Same as recent kind ( <i>nov. spec.</i> ) living in the bay.
8. — <i>globulosum</i> .	19. <i>Nucula</i> Near to <i>N. margaritacea</i> .
9. — One or two minute species, perhaps young specimens, — unknown.	20. <i>Corbula</i> Minute species, unknown.
10. <i>Trochus</i> <i>Nov. spec.</i> (?) same as one now living in the bay.	21. <i>Cardita</i> Ditto ditto
11. — <i>Nov. spec.</i> (?) nearly related to last; differs in not being granular on the surface.	22. <i>Pecten</i> <i>Nov. spec.</i> (?) very imperfect specimen.
	23. <i>Ostrea</i> Oysters of the same size now live in the bay.

I may add that a fossil encrusting coralline is the same with one now living in the bay.

Of these shells it is almost certain that twelve species (and the coralline) are absolutely identical with existing species; and that four more are perhaps so; the doubt partly arising from the imperfect condition of the specimens. Of the seven remaining ones, four are minute, and one extremely imperfect. If I had not made a collection (far from perfect) of the shells now inhabiting Bahia Blanca, Mr. Sowerby would not have known as living kinds, five out of the twelve fossils: therefore, it is probable, if more attention had been paid to collecting the small living species, some of the seven unknown ones would also have been found in that state. The twelve first shells, as well as the four doubtful ones, are not only existing species, but nearly all of them inhabit this same bay, on the shores of which they are likewise found fossil. Moreover, at the time, I particularly noticed that the proportional numbers appeared closely similar between the different kinds,—in those now cast up on the beach, and in those embedded with the fossil bones. Under these circumstances, I think, we are justified (although some of the shells are at present unknown to conchologists) in considering the shingle strata at Punta Alta, as belonging to an extremely modern epoch.



From the principle already adduced, namely, the regular and gradual elevation of this part of the continent, I should have judged from the small altitude of the beds at Punta Alta, that the formation had not been very ancient. The conclusion here arrived at, concerning the age of these fossil mammalia, is nearly the same, with that, inferred respecting those entombed in the Pampas; and it will hereafter be shown, that some of the species are common to the two districts. We may suppose, that whilst the ancient rivers of the Plata occasionally carried down the carcasses of animals existing in that country, and deposited them in the mud of the estuary; other animals inhabited the plains round the Sierra de la Ventana, and that lesser streams, acting together with the currents of a large bay, drifted their remains towards a point, where sand and shingle were accumulating into a shoal. The whole area has since been elevated: the estuary mud of the former rivers has been converted into wide and level plains; and the shoals of the ancient Bahia Blanca now form low headlands on the present coast.

The third locality, which I have to specify, is Port St. Julian, in latitude  $49^{\circ} 15'$  on the coast of Southern Patagonia. The tertiary plains of that country are modelled into a succession of broad and level terraces, which abut one above the other; and where they approach the coast, are generally cut off by a line of precipitous cliff. The whole surface is thickly covered by a bed of gravel, composed of various kinds of porphyries, and probably originating from rocks situated within the Cordillera. The lower part of the formation consists of several varieties of sandstone, and contains many fossil shells, the greater number of which are not found in a living state.

The south side of Port St. Julian is formed by a spit of flat land, of nearly a hundred feet in height; and on its surface existing species of littoral shells are abundantly scattered. The gravel is there covered (a circumstance which I did not observe in scarcely any other locality) by a thin but irregular bed of a sandy or loamy soil, which likewise fills up hollows or channels worn through it. In the largest of these channels the remains of the single fossil quadruped, which was here discovered, were embedded. The skeleton probably was at first perfect; but the sea having washed away part of the cliff, has removed many of the bones,—the remaining ones, however, still occupying their proper relative position to each other. I am inclined to attribute the origin of this earthy matter, to the

mud which might have accumulated in channels, and on the surface of the gravel, if this part of the plain had formerly existed as a harbour, such as Port St. Julian is at the present day. The Guanaco, the only large animal now inhabiting the wild plains of Patagonia, often wanders over the extensive flats, which are left dry at the head of the harbour during ebb tide: we may imagine that the fossil animal, whilst in a like manner crossing the ancient bay, fell into one of the muddy creeks, and was there buried.

I have stated that existing species of shells are scattered over the surface of this plain; namely, *Mytilus Magellanicus*; a second and undescribed species, now living on the beach; *M. edulis*; *Patella deaurata*; and on another part of the coast, but having similar geological relations, *Fusus Magellanicus*; *Voluta ancilla*; and a *Balanus*:—all these shells are among the commonest now living on this coast. Although they must have been lying exposed to the atmospheric changes for a very long period, they still partially retain their different colours. From these facts we know, with certainty, that the superficial deposit, containing the remains of the quadruped, has been *elevated* above the sea, within the recent period. From the structure of the step-like plains, which front the coast, it is certain that each step must have been modelled, subsequently to the elevation of the one standing above it; and, as the same recent shells occur on two higher plains, we may, with safety, conclude, that the earthy matter, forming the surface of this lower one, together with its embedded skeleton, was *deposited* long after the existence of the present species, still inhabitants of the sea. According, therefore, to the chronology, taken from the duration of species among the molluscs, the fossil quadruped of Port St. Julian must have been coeval, or nearly so, with those from Bahia Blanca.

Having now briefly described the principal circumstances in the geology of the three districts, to which I at first alluded, I will conclude, by observing, that the fossil mammalia of La Plata, Bahia Blanca, and Port St. Julian, must all have lived during a very modern period in the geological history of the world. It is not the proper place in this work to enter on any speculations, concerning the cause of the extinction of so many gigantic animals. I will only here add, that there is the strongest evidence against admitting the theory of a period of overwhelming violence, by which the inhabitants of the land could have been swept away, and



destroyed. On the contrary every thing indicates a former state of tranquillity, during which various deposits were accumulating near the then existing coasts, in the same manner, as we may suppose others are at this day in progress. The only physical change, which we know has taken place, since the existence of these ancient mammalia, has been a small and gradual rising of the continent; but it is difficult to believe, that this alone could have so greatly modified the climate, as to have been the cause of the utter extermination of so many animals. Mr. Owen will mention the exact locality where the remains of each quadruped were discovered; and, at the conclusion, it will be easy to specify by name those, which, from being embedded in the same deposit, are known formerly to have co-existed on the continent of South America.

## FOSSIL MAMMALIA.

BY MR. OWEN.

It may be expected that the description of the osseous remains of extinct Mammalia, which rank amongst the most interesting results of Mr. Darwin's researches in South America, should be preceded by some account of the fossil mammiferous animals which have been previously discovered in that Continent. The results of such a retrospect are, however, necessarily comprised in a very brief statement; for the South American relics of extinct Mammalia, hitherto described, are limited, so far as I know, to three species of Mastodon, and the gigantic Megatherium.

One of the above species of Mastodon (*Mast. Cordillerarum*) was established by Cuvier\* on remains discovered by Humboldt, in Quito, near the volcanic mountain, called *Imbaburra*, at an elevation of 1200 toises above the level of the sea; and likewise at the Cordilleras of Chiquitos, near Santa Cruz de la Sierra, a locality which is near the centre of South America. A second species (*Mastodon Humboldtii*, Cuv.†) is indicated by molar teeth, stated to have been discovered by the same philosophic traveller, in Chile, near the city of Concepcion. The third species of Mastodon appears to have once ranged in vast troops over the wide empire of Peru: numerous teeth were brought thence to Paris by Dombey,‡ and similar teeth, together with a humerus and tibia from Santa Fé de Bogota were placed by Humboldt at the disposal of Cuvier,§ who considered them to belong to the

\* See Ossements Fossiles, Ed. iv. tom. ii. p. 368. Pl. 27. fig. 1. 12.

† *Ibid.* p. 370. Pl. 27. fig. 5.

‡ *Ibid.* p. 347, 367.

§ *Ibid.* p. 337. Pl. 26. fig. 7.



*Mastodon angustidens*, a species of which the fossil remains are by no means uncommon in several localities of Europe. Cuvier is also disposed to refer to the same species the teeth of the Mastodon from Brazil and Lima, mentioned by Dr. W. Hunter in his observations on the *animal incognitum* from the Ohio.\* The Megatherium has been scientifically described and illustrated in the works of Bru, Cuvier, and D'Alton, whose accounts are founded on a nearly complete skeleton of this stupendous quadruped which has existed in the Royal Museum at Madrid for more than half a century. The few deficiencies in its osteography have recently been supplied by the descriptions and figures given by Dr. Buckland† and Mr. Clift,‡ taken from remains of the Megatherium, brought by Sir Woodbine Parish from Buenos Ayres, and which were discovered in the bed of the Rio Salado, a tributary of the Rio Plata. Sir Woodbine Parish's collection from the same locality, includes also remains of other species of extinct Edentata, which have not yet been described. M. D'Orbigny, in his travels in South America (vol. i. p. 96.), states that, in the banks of the Parana, he found the fossil remains of a large quadruped, of the size of an Ox,—another quadruped of the size of a Cat, apparently of the carnivorous order;—and a third, a Rodent as large as a Rat.

This meagre condition of the historical part of the subject of South American fossils by no means arises from their actual scarcity. The writings of some of the old Spanish authors, for instance, Torrubia, Garcillasso, and others,§ contain frequent allusions to the bones of giants, who in times of old dwelt in Peru. Legentil, also, in 1723, speaks as an eye-witness of these Peruvian remains; and his guides pointed out to him the traces of the thunder-bolts, by which the Anaks of the New World had been exterminated. Bones and teeth of the Mastodon are, according to Humboldt, so abundant in a locality near Santa Fé de Bogota in Columbia, that to this day it bears the name of the "Field of Giants."

But independently of these indications, the abundance and variety of the osseous remains of extinct Mammalia in South America are amply attested by the materials for the following descriptions, collected by one individual, whose

\* Philosophical Transactions, vol. lviii. p. 34. (1768.)

† Bridgewater Treatise, p. 139.

‡ Geological Transactions, vol. iii. p. 437. pl. 44, 45, 46.

§ Quoted by Cuvier, Ossem. Foss. Ed. iv. tom. ii. p. 351.

sphere of observation was limited to a comparatively small part of South America; and the future traveller may fairly hope for similar success, if he bring to the search the same zeal and tact which distinguish the gentleman to whom Oryctological Science is indebted for such novel and valuable accessions.

It is remarkable that all the fossils, collected by Mr. Darwin, belong to herbivorous species of mammalia, generally of large size. The greater part are referrible to the order which Cuvier has called Edentata, and belong to that subdivision of the order (*Dasypodidæ*) which is characterized by having perfect and sometimes complex molar teeth, and an external osseous and tessellated coat of mail. The Megatherium is the giant of this tribe; which, at the present day, is exclusively represented by South American species, the largest (*Dasypus Gigas*, Cuv.) not exceeding the size of a Hog. The hiatus between this living species and the Megatherium, is filled up by a series of Armadillo-like animals, indicated more or less satisfactorily by Mr. Darwin's fossils, some of which species were as large as an Ox, others about the size of the American Tapir. The rest of the collection belongs, with the exception of some small Rodents, to the extensive and heterogeneous order Pachydermata; it includes the remains of a Mastodon, of a Horse, and of two large and singular aberrant forms, one of which connects the Pachydermatous with the Ruminant Order; the other, with which the descriptions in the following pages commence, manifests a close affinity to the Rodent Order.



## A DESCRIPTION OF THE CRANIUM OF

## TOXODON PLATENSIS;

*A gigantic extinct mammiferous animal, referrible to the Order Pachydermata, but with affinities to the Rodentia, Edentata, and Herbivorous Cetacea.*

THE cranium, which is the subject of the present description, was found in the Sarandis, a small stream entering the Rio Negro, and about 120 miles to the N. W. of Monte Video: it had been originally embedded in a whitish argillaceous earth, and was discovered lying in the bed of the rivulet, after a sudden flood had washed down part of the bank.

The zoological characters deducible from this cranium, forbid its association, generically, with any known Mammiferous animal, and it must therefore be referred to an extinct genus, which I propose to call *Toxodon*,\* from the curved or arched form of the teeth, as will afterwards be described. The specific name, in the absence of other means of knowing the peculiarities of the animal than those afforded by the skull, may be most conveniently taken from the district (La Plata), in which its remains were first discovered.

The dimensions of the cranium of the *Toxodon Platensis* amply attest that the animal to which it belonged was of a magnitude attained by few terrestrial quadrupeds, and only to be compared, in this respect, with the larger Pachyderms, or the extinct Megatherium. The length of the skull (of which a base view of the natural size is given in Plate I.) is two feet four inches: the extreme breadth one foot four inches. The other requisite admeasurements are given in the table at the conclusion of this description.

The general form of the skull, as seen from above, is pyriform; but viewed sideways, and without the lower jaw, it is semi-ovate; it is depressed, elongate, of considerable breadth, including the span of the zygomatic arches, but becoming rather suddenly contracted anterior to them, the facial part thence growing narrower to near the muzzle, which again slightly expands.

Among the first peculiarities which strike the observer, is the aspect of the plane of the occipital foramen, and of the occipital or posterior region of the cranium, the latter of which inclines from below upwards and forwards at an angle of 50° with the basal line of the skull. This slope of the back part of the skull is one of the characteristics of the Dinotherium; it is common to all the Cetacea, and is met with in a slighter degree in many Rodentia, and in the great Ant-eater and some others of the Edentate order. The corresponding aspect of the *foramen magnum* presents nearly the opposite extreme to man in the occipital

\* Τοξον, arcus; οδον, dens.

scale, proposed by Daubenton to determine the diversities of the form of the cranium, as a gage of the intelligence of different animals\*; and the indication of the limited capacity of the *Toxodon*, thus afforded, is strengthened by the very small proportion, which the bony walls of the cerebral cavity bear to the zygomatic and maxillary parts of the skull, and to the size of the vertebral column, as indicated by the condyloid processes, and foramen magnum.

The zygomatic arches are of remarkable size and strength; they commence immediately anterior to the sides of the occipital plane, increase in vertical extent as they pass outwards, forwards and downwards, and are suddenly contracted as they bend inwards to abut against the sides of the sockets of the two posterior molar teeth.

The cranial cavity is remarkably narrow at the space included by the zygomatic arches; being, as it were, excavated on each side to augment the space for the lodgment of the temporal muscles, so that its diameter at this part is less than that of the anterior extremity of the upper jaw. The upper surface of the cranium expands to form the post-orbital processes, and again contracts anterior to these.

The muscular ridges, or other characters, at the top of the skull, cannot be precisely determined, as a great proportion of the outer table of the bone is broken away, exposing a coarse and thick diplœ. There seems, however, to have been a strong ridge separating the occipital from the coronal or upper surface of the cranium. The form of the remaining parts, which are modified in relation to the attachment of the muscles of the jaws, indicates that these were powerfully developed both for the offices of mastication and prehension. The general form of the skull, while it presents certain points of resemblance to that of the aquatic Pachydermata, and even of the Carnivora, has much that is peculiar to itself; but, in the facial part, it approaches the nearest to that of the Rodentia; and the dentition of the *Toxodon*, as exhibited in the upper jaw, corresponds with that which characterizes the Rodent Order.

The teeth of the *Toxodon* consist of molars and incisors, separated by a long diastema, or toothless space. In the upper jaw the molars are *fourteen* in number, there being seven on each side; the incisors *four*, one very large, and one small, in each intermaxillary bone.

The general form and nature of the teeth are indicated by the sockets; and the structure of the grinders is exhibited in a broken molar, the last in the series on the left side of the jaw of the present cranium (See a figure of the grinding surface restored of this tooth, fig. 2, Pl. I.), and by another perfect molar, the last but one on the right side of the upper jaw, which, though not belonging to the same individual as the skull here described, undoubtedly appertains to the same species.

\* Mem. de l'Acad. des Sciences de Paris, 1764, p. 568.



This latter tooth (Fig. 3, Pl. I.; figs. 2 and 3, Pl. IV.) was found by itself, embedded in the banks of the Rio Tercero, or Carcarana, near the Parana, at the distance of a hundred and eighty miles from the locality where the head was discovered. Fragments of a molar tooth of a *Toxodon*, apparently the seventh of the left side, upper jaw, were also found at Bajada de St<sup>e</sup> Fé, in the province of Entre Rios, distant forty miles from the mouth of the Rio Tercero.

All the molar teeth are long and curved, and without fangs,\* as in most of the herbivorous species of the Rodent Order: in those, however, with curved grinders, as the *Aperca* or Guinea-pig, and *Cavia Patagonica*, the concavity of the upper grinders is directed outward, the fangs of the teeth of the opposite sides diverging as they ascend in the sockets; but, in the *Toxodon*, the convexity of the grinders is outward, and the fangs converge and almost meet at the middle line of the palate, forming a series of arches, capable of overcoming immense resistance from pressure. (See the upper view of the skull, Plate III., in which the fractures expose to view a part of the series of these arched sockets.)

Of the incisors, the two small ones (the sockets of which are indicated at *s s*, Pl. III.) are situated in the middle of the front of the upper jaw, close to the suture between the intermaxillaries, and the two large ones in immediate contiguity with the small incisors, which they greatly exceed in size. The sockets of the two large incisors (*t t*, Pl. III.) extend backwards, in an arched form, preserving a uniform diameter, as far as the commencement of the alveoli of the molar teeth: the curve which they describe is the segment of a circle; the position, form, and extent of the sockets of these incisors are the same as in those of the corresponding teeth of the Rodentia.

The matrix, or secreting pulp of the large incisors, was lodged, as in the Rodentia, in close proximity with the sockets of the anterior molars; and we are enabled to infer, from the form of the incisive sockets, notwithstanding the absence of the teeth themselves, that the pulp was persistent, and that the growth of these incisors, like those of the Rodentia, continued throughout life.

This condition, joined with the form and curvature of the socket, implies a continual wearing away of the crown of the tooth by attrition against opposing incisors of a corresponding structure in the lower jaw: and as a corollary, it may be inferred that the teeth in question had a partial coating of enamel, to produce a cutting edge, and were, in fact, true *dentes scalprarii*. The number of incisors in the upper jaw of *Toxodon*, is not without its parallel in the Rodent Order, the genus *Lepus* being characterized by four, instead of two superior incisors, which also present a similar relative size but have a different relative position, the

\* True fangs exist only in teeth of temporary growth, they may be one or more in number, but always diminish in size as they recede from the crown of the tooth, and are either solid, or with a very small canal.

small incisors, in the hare and rabbit, being so placed immediately behind the large pair, as to receive the appulse of the single pair of incisors in the lower jaw.

In the *Toxodon* the position of the incisors, in the same transverse line, might lead to the inference, that they were opposed by a corresponding number in the lower jaw; but the numerous examples of inequality, in the number of incisors, in the upper and lower jaws of existing mammalia, forbid any conclusion on this point.\* The sockets of the small mesial incisors of the *Toxodon* (*s s*, Pl. III.) gradually diminish in size, as they penetrate the intermaxillary bones, and we may, therefore, infer that the pulp was gradually absorbed in the progress of their development; and that, like ordinary incisors, their growth was of limited duration, and their lodgment in the jaw effected by a single conical fang.

I may observe, that the formation of a fang is the necessary consequence of the gradual absorption of the matrix or pulp of a tooth; for the pulp continues, as it diminishes in size, to deposit ivory upon the inner surface of the cavity of the tooth from which it is receding, and the tooth or fang thus likewise progressively diminishes in size. The formation of the socket proceeds uninterruptedly, and the bone encroaching upon the space left by the tooth, closely surrounds the wasting fang, and affords it a firm support; and thus an inference may be drawn from the form of the socket alone, as to whether the tooth it contained had or had not one or more conical fangs, and consequently whether its growth was temporary or uninterrupted.

Applying this reasoning to the molar teeth of the *Toxodon*, we infer that their growth, like those of most of the Phyllophagous Rodents, of the *Megatherium* and *Armadillo*, was perpetual, because their sockets are continued of uniform size from the open to the closed extremity; and the molar tooth which is preserved proves the accuracy of the deduction, inasmuch as its base is excavated by a large conical cavity for the lodgment of the pulp, the continued activity of which was the compensation here designed to meet the effects of attrition on the opposite or grinding surface of the tooth.

The molar tooth discovered by Mr. Darwin in the banks of the Tercero, not only belonged to the same species as the skull under consideration, but to an individual of the same size; it fits exactly into the socket next to the posterior one of the right side. The figures subjoined of this molar tooth (Fig. 3, Pl. I.; figs. 2 and 3, Pl. IV.) almost preclude the necessity of a description. The transverse section of the tooth gives an irregular, unequal sided, prism; the two broadest sides of which converge to the anterior angle, which is obtusely rounded. The

\* This was written before an examination of the fragment of a lower jaw, forming part of Mr. Darwin's collection of Fossil Remains, had led me to suspect that it was referrible to the genus *Toxodon*; should this suspicion prove correct, the four unequal incisors of the upper jaw are opposed to six equal sized ones in the lower.



outer surface of the tooth (fig. 2, Pl. IV.) is slightly concave in the transverse direction, but undulating, from the presence of two slight convex risings which traverse the tooth lengthwise. The inner surface presents at its anterior part a slightly concave surface, and posteriorly two prominent longitudinal convex ridges, separated by a groove which is flat at the bottom, and from the anterior angle of which the reflected fold of enamel penetrates the substance of the tooth, advancing obliquely forwards, rather more than half way across the body of the tooth. A longitudinal ridge of bone projects from the internal side of the socket, and fits into the groove above mentioned, and as a corresponding ridge exists in all the sockets of the grinders, save the two anterior small ones, we may infer that the five posterior grinders on each side, had a similar structure to the tooth above described. The external layer of enamel is uniformly about half a line in thickness; it is interrupted for the extent of nearly three lines at the anterior angle, and for more than double that extent at the posterior part of the tooth, which is consequently worn down much below the level of the rest of the grinding surface. Where the ivory is thus unprotected by the enamel, it has a coat of cæmentum, which also fills up the small interval at the origin of the reflected fold of enamel. On the grinding surface of the entire tooth, and on the fractured ends of the mutilated molars, the component fibres, or tubules, of the ivory, are readily perceptible by the naked eye, diverging from the line which indicates the last remains of the cavity of the pulp of the tooth, as it was progressively obliterated during growth.

Although the complication of the grinding surface by the inflection of simple or straight folds of enamel is peculiarly characteristic of the Rodent type, we must regard the number of molar teeth, and their diminution of size as they advance towards the anterior part of the jaw, in the *Toxodon*, as indicative of a deviation from that order, and an approach to the *Pachyderms*. The common number of grinders in the upper jaw of Rodent animals is eight, four on each side. In some genera, as *Lemmus*, *Mus*, *Cricetus*, there are only three on each side, and in *Hydromys* and *Aulacodus*, only two on each side. In *Lepus*, however, we find six on each side of the upper, and five on each side of the lower jaw. The *Toxodon*, like the *Tapir* and *Hippopotamus*, has seven on each side of the upper jaw: the first in each of these species being the smallest. It is worthy of notice, however, that the *Capybara* which adheres to the Rodent type in the number of its molars, presents in the vastly increased size, and additional number of component laminæ of the posterior grinders, an approximation to the pachydermatous character just aduced, and the bony palate at the same time presents an expansion between these molars, offering a resemblance to the *Toxodon* which I have not found in any other Rodent besides the *Capybara*.

The most important deviation from the Rodent structure presented by the teeth, occurs in the direction of the reflected fold of enamel, and such a deviation

might have been inferred, even in the absence of the teeth, from the structure of the articular surface, or glenoid cavity for the reception of the condyle of the lower jaw. As the ridge of enamel runs, as above described, in a direction approaching that of the longitudinal axis of the skull, it is obvious that the grinding motions of the lower jaw should be in a proportionate degree in the transverse direction. The glenoid cavity, therefore, instead of being a longitudinal groove, and open behind, as in the true Rodents, is extended transversely, and is defended behind by a broad descending bony process preventing the retraction of the jaw, and showing marks of the forcible pressure to which it was subject.

It is worthy of observation that, in the *Wombat*,—which exhibits the Rodent type of dentition, and, like the *Toxodon*, has remarkably curved molars, but in an opposite direction,—the condyle of the lower jaw is also extended transversely, and adapted to an articular surface, which admits of lateral motion in the trituration of the food. In the outward span of the zygomatic arches, in which *Toxodon* deviates from the Rodentia, we may trace a relation of subordinacy to the above structure of the grinding teeth and joint of the lower jaw: the widening of the arches giving to the masseter muscles greater power of drawing the jaw from side to side. The depth of the zygoma bespeaks the magnitude of these masticatory muscles, and the included space shews that the temporal muscles were also developed to a degree, which indicates the force with which the great incisors at the extremity of the jaws, were used; probably, like the canines of the *Hippopotamus*, to divide or tear up by the roots the aquatic plants, growing on the banks of the streams, which the *Toxodon* may have frequented.

In the Rodentia, the zygoma, though sometimes as deep as in the *Toxodon*, is generally almost straight, and the space included between it and the cranium is consequently narrow. The zygoma also is placed more forwards in all true Rodents, than in the *Toxodon*; and, instead of abutting against the posterior alveoli, it terminates opposite the anterior ones. It thus affords such an attachment to the masseter, that this muscle extends obliquely backwards to its insertion in the lower jaw, at an angle which enables it to act with more advantage in drawing forwards the lower jaw,—a motion for which the joint is expressly adapted. In many Rodents, also, there is a distinct muscle, or portion of the masseter, which passes through the ant-orbital foramen, which is on that account of large size. In examining the cranium of *Toxodon*, with reference to this structure, it was found that the ant-orbital foramen was not larger than might have been expected to give transmission to nerves requisite for supplying with sensibility the large lips, and whiskers with which the expanded muzzle of this remarkable quadruped was probably furnished.

Having thus examined the cranium of the *Toxodon* in its relation, as a



mechanical instrument, subservient to the function of digestion; we next proceed to consider the structure and composition of those cavities of the skull which gave lodgment and protection to the organs of *special* sense, and endeavour to deduce from their structure conclusions as to the degree in which the organs were developed, and the circumstances under which the senses were exercised.

The orbit of *Toxodon* forms the anterior boundary of the zygomatic area; it is about as distinctly defined as in the Tapir or Dugong, having its osseous rim less complete than in the Hippopotamus, yet more developed than in the Capybara, Coypus, and many other Rodentia, in which the orbit is scarcely distinguishable in the cranium from the small space occupied by the origin of the temporal muscle.

The lower boundary of the orbit in *Toxodon* is formed by an excavation in the upper and anterior part of the zygoma; the upper boundary by a strong and rugged overarching process of the frontal bone, the posterior angle of which (*a*, Pl. III.) descends a little way, but leaves a space of three inches and a half between it and the opposite angle of the malar bone below (*b*, Pl. II. and III.), the circumference of the orbit being completed probably by ligament in the recent subject. The cavity thus circumscribed is remarkable for the preponderance of the vertical over the transverse or longitudinal diameter, and indicates great extent of motion of the eyeball in the vertical direction, such as may be supposed to be well adapted to the exigencies of an amphibious quadruped. The orbit of the Capybara, or Water-hog, makes a near approach to the form just described. In the elevation of the supra-orbital boundary, and its outward projection in the *Toxodon*, we perceive an approximation to the form of the orbit in the Hippopotamus, but the size of the orbit is relatively larger in the *Toxodon*, which in this respect manifests its affinity to the Rodentia.

In that part of the bony structure of the auditory apparatus, which is visible on the exterior of the cranium, the skull of the *Toxodon* presents a character in which it recedes from the Rodentia. In these, the tympanic portion of the temporal bone is remarkably developed, forming a large bulla ossea between the glenoid cavity and the occiput; and it always remains disunited to the other elements of the temporal bone. In the *Toxodon* the tympanic bone (*c*, Pl. II.) consists of a rough compressed vertical osseous plate, wedged in transversely between the occiput and the posterior part of the glenoid cavity. The internal extremity of this plate points inwards and forwards, representing the styloid process; behind this is seen the petrous bone, which forms a small angular protuberance at the basis cranii, and is less developed than in the Hippopotamus. Anterior to the petrous bone are the orifices of the Eustachian tube, and carotid canal; external to it is the great foramen lacerum, for the jugular vein and nervus vagus; and behind it is the anterior condyloid foramen. The foramen auditorium externum is only half an

inch in diameter, and gives passage to a long and somewhat tortuous meatus, which passes inwards and slightly forwards and downwards; its direction being precisely the same as in the Hippopotamus; it was accompanied, probably, by as small an external auricle.

But the indications of the aquatic habits of the *Toxodon*, which are presented by the osseous parts relating to the senses of sight and hearing, are of minor import compared with those afforded by the bony boundary of the nostrils. This boundary circumscribes a large ovate aperture, the aspect of whose plane is upwards, and a little forwards, as in the Herbivorous Cetaceans, and especially the Manatee (*Trichechus Manatus*, Cuv.) In one part of the bony structure of the nasal cavity the *Toxodon* deviates, however, in a marked degree from the Cetaceous structure; I allude to the frontal sinuses, which are exposed by the fracture of the upper part of the skull. (They are shewn in Plate III., and an asterisk is placed on one of the narrow canals of intercommunication between the sinuses and the nasal passages.) The posterior orifice of the nasal cavity is relatively larger and wider than in the Herbivorous Cetaceans, and differs both in form and aspect in consequence of the greater extent of the bony palate. The *Toxodon* further differs from the Manatee and Dugong, in the firm nature of the connexion of the bones of the head; and it differs from the Hippopotamus in the strong attachment of the intermaxillary bones to the maxillaries.

There next remain to be described, as far as the shattered condition of the skull will permit, the relative position, extent, and connexions of the principal bones composing it.

The *occipital bone* exhibits a complete confluence of its basilar, condyloid, and supra-occipital elements. The basilar portion, in connexion with the corresponding element of the sphenoid bone, describes a curve whose convexity is downwards. The condyles are large, extended in the transverse direction, completely terminal, and a little inclined downwards below the level of the basilar process. The curve of the articulating surface describes, in the vertical direction, two-thirds of a circle, indicating that the head must have possessed considerable extent of motion upwards and downwards upon the atlas; thus, while the body of the *Toxodon* was submerged, the head probably could be raised so as to form an angle with the neck, and bring the snout to the surface of the water without the necessity of any corresponding inflection of the spine. Indeed, in the form and position of the condyles, the *Toxodon* more nearly resembles the true Cetacea than any other existing mammalia; and it is only with these that it can be compared in regard to the aspect of the plane of the occipital foramen, and of the occipital region of the skull. This is inclined forwards from the occipital foramen at such an angle, that on viewing the skull from above, not only the



condyles, but the entire circumference of the occipital foramen are visible. (See Pl. III.) The upper part of the supra-occipital plate presents a broad rugous depression, indicative of the insertion of strong cervical muscles, and probably of a *ligamentum Nuchæ*.\*

The ex-occipital processes advance forwards for about an inch beyond the condyles, and then suddenly extend outwards at right angles to the former line, and terminate in the form of vertically compressed bony plates; the lower rugged margins of which represent or perform the office of the mastoid processes (*d, d*, Pls. II. and III.). The breadth of the entire occipital region of the skull (fig. 1, Pl. IV.) appears to have been, allowing for the fractures, about one-third more than the height of the same part.

The great development of the *tympanic* bones in the Rodentia, occasions the intervention of a considerable space between the occipital bone and the zygomatic process of the temporal; but in the great *Toxodon*, in which the sense of hearing was doubtless inferior to that enjoyed by the small and timorous Rodents, the tympanic bone is reduced to a thin plate, which is wedged in between the occiput and glenoid cavity. In this structure, and the consequent posterior position of the glenoid cavity, there is a close resemblance between the *Toxodon* and the Hippopotamus, Tapir, and Rhinoceros.

The *squamous* element of the temporal bone (*n*, Pl. II.) forms a small proportion of the lateral walls of the cranium, and also enters into the composition of the lateral and superior parts of the posterior region of the cranium, where two deep fossæ perforated by large vascular foramina, indicate the junction of the squamous bones with the supra-occipital bone. The posterior surface of the skull is thus divided into three broad and shallow depressions, the two lateral facets being slightly over-lapped by the middle one, at their junction with it. In this structure the *Toxodon* resembles the Hippopotamus, and differs considerably from the Cetacea, in which the occipital region is rendered convex by the extraordinary development of the brain within.

The *zygomatic* process of the temporal bone projects boldly outwards at its commencement, where it is of great strength, and three-sided; the glenoid cavity extends transversely across the base or inferior surface of this part; the lateral surfaces converge to form the ridge or upper boundary of the zygoma. The depth of the glenoid cavity is increased by a transverse production of bone both before and behind it: the posterior process (*g*, Pl. II.) descends the lowest, and affords the requisite defence against backward dislocation of the lower jaw; the pressure of the condyle against this process is denoted by a well defined, transversely-ovate, flattened and smooth surface, as if the bone had been planed down at that

\* I have ascertained that this elastic ligament exists in the neck of the Dugong.

part: the anterior transverse boundary is convex and smooth, and probably formed part of the articulation for the lower jaw. The lower facet of the zygoma anterior to the glenoid cavity gradually contracts in breadth, as it advances forward, and at the distance of three inches from the articular cavity the zygoma changes from a prismatic to a laminar form. It is at this point that the zygomatic suture commences, at the lower margin of the arch; whence it extends directly forwards for more than half its length, and then bends upwards at a right angle. The zygomatic suture has a similar course in the *Capybara*, and *Hippopotamus*.

The remainder of the zygoma is formed externally by the *malar* bone (*g* Pl. II.), which in its position is intermediate to the Rodent and Pachydermatous structures. It is not suspended in the middle of the zygomatic arch, as in the former order; neither does it extend into the region of the face so far anterior to the orbit as in the Tapir or Hippopotamus. The exterior line of the malo-maxillary suture defines the orbit anteriorly; but from this line the maxillary bone extends backwards, along the inner side of the malar portion of the zygoma, until it almost reaches the temporo-malar suture; thus abutting by an oblique surface against nearly the whole internal facet of the malar bone, and materially contributing to the general strength of the zygomatic arch. The malar bone is of considerable vertical extent, and presents a rugged and thickened inferior margin for the attachment of the masseter. The upper margin of the malar bone is smoothly rounded, and presents a regular semi-circular excavation, forming the lower boundary of the orbit. The relative magnitude of the zygomata to the entire cranium far exceeds in the *Toxodon* that which exists in the Hippopotamus or any other known Pachyderm. This arises from the great vertical development of the malar bone behind the orbit, and the vertical expansion of the temporal portion of the arch. The oblique position of the zygoma, descending as it advances forwards, is deserving of attention, as the *Toxodon*, in deviating from the Pachyderms in these respects, makes an evident approach to the herbivorous Cetaceans, as the Dugong and Manatee: in the latter Cetacean we observe a similar development of the lower part of the zygomatic process of the malar bone. It is here, also, that we may perceive an indication of a resemblance between the Megatherium and *Toxodon*.

There is no discernible trace of the *lachrymal* bone (*e*, Pl. II.) having extended, as in the Hippopotamus beyond the anterior boundary of the orbit: the lachrymal foramen is situated rather deep in the orbit, and the bone itself appears to have been of very small size.

The surface of the supra-orbital process of the *frontal* bone (*c*, Pl. II.) is deserving of attention, as it presents a peculiar ruggedness which is not found in any other part of the skull; the irregularity seems, as it were, to have been produced by the impression of numerous small tortuous and anastomosing vessels. In the

E



skull of a Sumatran two-horned Rhinoceros, in the Museum of the College of Surgeons (No. 816), the circumference of that part of the surface of the skull which supported the posterior horn, and which includes precisely the same part of the os frontis, presents the same character, the surface being broken by numerous vascular impressions. On the supposition that this character of the supra-orbital arch in the *Toxodon* might indicate the superincumbency of a bony case, I examined the skulls of two Armadillos, *Dasypus Peba* and *Das. 6-cinctus*, and found that in the *Dasypus 6-cinctus*, the supra-orbital ridges, which are slightly elevated, to support the cephalic plate, presented, in a minor degree, a corresponding rugosity. May we venture then to conjecture that the *Toxodon* was defended by an ossified integument like the Armadillo, or that it was armed with an epidermic production, analogous to the horn of the Rhinoceros; or had the rugous surface in question as little relation with the parts that covered it as the sculptured surface of the malar bones in the Cavy?

After forming the rugged and prominent supra-orbital processes already described, the frontal bone continues to send backwards a slightly elevated ridge or *crista*, circumscribing the origin of the temporal muscles, but the extent of this ridge, and the disposition of the inter-orbital portion of the frontal bones cannot be determined in the present mutilated specimen. The fractures it has sustained are not, however, wholly unattended with advantage; they expose the structure of the diploë, which from its coarseness of texture and thickness, resembles that of the Cetaceous crania; and what is of still more importance, they also demonstrate the existence and form of the frontal sinuses.

The cavity of the nose is extensive, and the remains of the ossa spongiosa superiora testify that the *Toxodon* enjoyed the sense of smell to a degree equal at least to that of the Hippopotamus.

The *sphenoid bone* resembles that of the Hippopotamus, but it contributes a larger share to the formation of the internal pterygoid processes (*p*, Pl. II.); these are of a simple form, and more developed than in the Hippopotamus; they project outwards to a greater extent, and terminate in a point. The sphenoid also sends off a short and thick pointed process from the posterior part of the base of the internal pterygoid processes. The ala of the sphenoid does not rise so far into the orbit, nor does it articulate with the parietal bone, as in the *Hippopotamus*; but in this part of its structure, is the same as in the Rhinoceros. The sphenopalatine foramen is relatively larger than in the above-named Pachyderms, and is bounded above by the descending orbital plate of the frontal bone.

The palatal processes of the *palatine* bones terminate anteriorly between the last molars, and extend backwards for some distance beyond the alveolar processes, increasing the extent of the bony roof of the mouth posteriorly: this is a structure in which the *Toxodon* deviates both from the Rodents, and Pachyderms,

and resembles the Armadillos among the Edentata; excepting that the post-dental part of the bony palate in the *Toxodon* is suddenly contracted in breadth. The palato-maxillary suture is in the form of a chevron, with the angle directed forwards, as in the Hippopotamus and Cavy, but truncated.

The *superior maxillary* bones (*r*, Pl. II.) are united posteriorly to the malar, as above described: they ascend and join the frontal and nasal bones: their outer surface is almost vertical, smooth, and slightly undulating; perforated at its posterior part by the ant-orbital foramen, and joined anteriorly to the intermaxillaries by a suture running in the sigmoid direction (as shewn in Pl. II.) from the middle of the nasal cavity, to within four inches of the anterior boundary of the upper jaw. We have, in the position and extent of this suture, and the absence of tusks and their large prominent sockets, a most important difference between the *Toxodon* and Hippopotamus. The chief peculiarity in the maxillary bones, obtains in the arched form of the alveolar processes, corresponding to the shape and position of the grinders above described, and which are peculiar among known mammalia to the present genus. The palatal surface of the maxillary bones is obliquely perforated by two large foramina, from which two deep longitudinal grooves extend forwards, and are gradually lost; we find the posterior palatine foramina represented by similar grooves and foramina in the Cavy.

The *intermaxillary* bones (*d*, Pls. II. and III.), though large, are relatively of less extent than in the Rodents generally. The nasal processes do not reach the frontal bone, but are limited to the anterior half of the nasal boundary; approaching in this respect to the Herbivorous Cetacea. In the outward expansion of their anterior extremities, the intermaxillaries resemble those of the Hippopotamus, in which, however, this character is more strongly marked. The intermaxillaries in the Hippopotamus are also much less firmly united to the maxillary bones than in the *Toxodon*, and are consequently commonly lost in the fossil crania. On the palatal surface of the intermaxillary bones there are two grooves which diverge forwards from the line of the suture; and anteriorly to these grooves there are the two large anterior palatine foramina. The maxillo-intermaxillary sutures on the palate converge as they extend backwards to a point; there appears to have been a fissure left between this suture and the mesial suture of the intermaxillaries; in which structure the *Toxodon* resembles the Hippopotamus.

After summing up the different affinities, or indications of affinity, which are deducible from the cranium of this most curious and interesting fossil mammal, we are led to the conclusion, assuming it to have had extremities cased in hoofs, that it is referrible to the Order Pachydermata. But the structure, form, and kind of teeth in the upper jaw, prove, indisputably, that the gigantic *Toxodon* was intimately related to the Rodent Order. From the characters of this order, as afforded by the existing species, the *Toxodon*, however, differs in the relative



position of the supernumerary incisors, and in the number, and direction of the curvature, of the molars. If, moreover, the lower jaw, next to be described, belong, as I believe, to the *Toxodon*, the dental character of the genus will be *incisors*  $\frac{3}{2}$ ; *pro laniariis diastema*; *molars*  $\frac{7}{4}$ .

The *Toxodon* again deviates from the true Rodentia, and resembles the Wombat, and the *Pachyderms*, in the transverse direction of the articular cavity of the lower jaw.

It deviates from the Rodentia, and resembles the *Pachydermata* in the relative position of the glenoid cavities and zygomatic arches, and in many minor details already alluded to.

In the aspect of the plane of the occipital foramen, and occipital region of the skull; in the form and position of the occipital condyles; in the aspect of the plane of the anterior bony aperture of the nostrils; and in the thickness and texture of the osseous parietes of the skull, the *Toxodon* deviates both from the Rodentia and existing *Pachydermata*, and manifests an affinity to the *Dinotherium* and Cetaceous Order, especially the Herbivorous section.

At present we possess no evidence to determine whether the extremities of the *Toxodon* were organized on the ungulate or unguiculate type, nor can we be positive, from the characters which the skull affords, that the genus may not be referrible to the *Mutica* of Linnæus;\* although the development of the nasal cavity and the presence of large frontal sinuses render it extremely improbable that the habits of this species were so strictly aquatic, as the total absence of hinder extremities would occasion.

Where the dentition of a mammiferous animal is strictly carnivorous, this structure is obviously incompatible with a foot incased in a hoof:—but where the teeth are adapted for triturating vegetable substances the case is different. If animals so characterized are of small size and seek their food in trees, or if they burrow for roots or for shelter, the vegetable type of dentition must co-exist with unguiculate extremities, as in the Edentata and Rodentia generally: but the largest genus (*Hydrochærus*) of the Rodent Order, whose affinity to the *Pachydermata* is manifested in its heavy shapeless trunk, thinly scattered bristly hair, and many other particulars, has each of its toes inclosed in a miniature hoof.

The affinity above alluded to, is too obvious to have escaped popular notice, and the *Capybara*, from its aquatic habits, has obtained the name of Water-hog. It is highly interesting to find that the continent to which this existing aberrant

\* The German Translator (See *Frorieps Notizen.*, 1837, p. 119) of the abstract of my description of the *Toxodon*, published in the Proceedings of the Geological Society, asks, what is the *Mutica* (misprinted *Muticata*), of Linnæus? The term is quoted from the *Systema Naturæ*, Ed. xii. p. 24. Linnæus first divides Mammalia into three groups, according to modifications of the locomotive organs, viz. *Unguiculata*, *Ungulata*, *Mutica*, and subdivides these, according to modifications of the dentary organs, into the orders, *Bruat*, *Glires*, *Primates*, &c.

form of Rodent is peculiar, should be found to contain the remains of an extinct genus, characterized by a dentition which closely resembles the Rodent type, but manifesting it on a gigantic scale, and tending to complete the chain of affinities which links the *Pachydermatous* with the Rodent and Cetaceous Orders.

ADMEASUREMENTS OF THE CRANIUM OF TOXODON.										feet	inches	lines
Extreme length	.	.	.	.	.	.	.	.	.	2	4	...
Extreme breadth	.	.	.	.	.	.	.	.	.	1	4	..
Extreme height, (exclusive of the lower jaw)	.	.	.	.	.	.	.	.	.	...	10	...
Length of zygomatic process	.	.	.	.	.	.	.	.	.	1	1	6
Depth or vertical extent of do.	.	.	.	.	.	.	.	.	.	...	6	...
Transverse extent of zygomatic fossa	.	.	.	.	.	.	.	.	.	...	6	...
Transverse diameter of cranium between the zygomatic arches	.	.	.	.	.	.	.	.	.	...	5	...
Transverse diameter of occipital plane of the cranium	.	.	.	.	.	.	.	.	.	1	...	...
From the outside of one condyle to that of the opposite condyle	.	.	.	.	.	.	.	.	.	...	8	6
Length of the bony palate	.	.	.	.	.	.	.	.	.	1	6	...
Extreme breadth of ditto	.	.	.	.	.	.	.	.	.	...	6	...
Breadth of palate at the intermaxillary suture	.	.	.	.	.	.	.	.	.	...	2	6
Do. do. behind the molar alveoli	.	.	.	.	.	.	.	.	.	...	3	...
Longitudinal extent of the molar alveoli	.	.	.	.	.	.	.	.	.	...	9	6
Do. do. diastema	.	.	.	.	.	.	.	.	.	...	5	6
Transverse diameter of posterior nasal aperture	.	.	.	.	.	.	.	.	.	...	3	9
Do. do. of occipital foramen	.	.	.	.	.	.	.	.	.	...	3	...
Do. do. of glenoid cavity	.	.	.	.	.	.	.	.	.	...	4	6
Antero-posterior do of ditto	.	.	.	.	.	.	.	.	.	...	1	...

#### DESCRIPTION OF FRAGMENTS OF A LOWER JAW AND TEETH OF A TOXODON.

Found at Bahia Blanca, in latitude 39° on the East coast of South America.

In looking over some fragments of jaws and teeth, forming part of Mr. Darwin's collection of South American mammiferous remains, and which had been set aside with mutilated specimens referrible to species belonging to the family of Edentata, my attention was caught by the appearance of roots of teeth projecting, in a different direction from the grinders, from the fractured anterior extremity of a lower jaw, and I was induced to examine minutely the structure of the teeth in this specimen, and to search the collection for corresponding fragments. The result was the discovery of portions of the two rami, and the commencement of the symphysis of a lower jaw, containing anteriorly the roots of



six incisors, and at least six molars on each side; but as the rami had been fractured through the middle of the sixth alveolus, the number of grinders may have corresponded with those in the upper jaw of the *Toxodon*.

The most perfect of these fragments is figured in Pl. V. figures 1 and 4; figure 2 shows the form of the teeth in transverse section, and the disposition of the enamel upon the grinding surface of the molars on the right side, as restored from a comparison of the fractured teeth in the two rami. From the remains of the symphysis shown at fig. 4, it will be seen that the jaw was remarkably compressed, or narrow from side to side; while the rami (fig. 1.) were of considerable depth, in order to give lodgment to the matrices and bases of grinders enjoying uninterrupted growth.

The pulps of the six incisors in this lower jaw are arranged in a pretty regular semi-circle, whose convexity is downwards; the teeth themselves are directed forwards, and curved upwards, like the inferior incisors of the Rodentia. The form and degree of the curvature are shown in the almost perfect incisor (Pl. V. fig. 5) which corresponds with the left inferior incisor of the lower jaw, and was found in the same stratum, but belonged to another individual.

These incisors are nearly equal in size: they are all hollow at their base, and the indurated mineral substance impacted in their basal cavities well exhibits the form of the vascular pulps which formerly occupied them. Sufficient of the tooth itself remains in four of the sockets to show that these incisors, like the nearly perfect one (fig. 5), had only a partial investment of enamel; but though in this respect, as well as in their curvature and perpetual growth, they resemble the *dentes scalprarii* of the Rodentia, they differ in having a prismatic figure, like the inferior incisors of the Sumatran Rhinoceros, or the tusks of the Boar. Two of the sides, viz., those forming the anterior convex and mesial surfaces of the incisor have a coating of enamel, about half a line in thickness, which terminates at the angles between these and the posterior or concave surface. In plate V. fig. 4, the enamel of the broken incisors is represented by short lines, showing the direction of its crystalline fibres; the white space immediately within the enamel shows the thickness of the ivory at the base of the tooth, the included gray substance represents a section of the formative matrix or pulp of the tooth, which was of the usual conical form: the inferior broken end of the incisor (fig. 5,) appears to have been distant about one-third from the apex of the pulp.

From the relative position of the bases or roots of these incisors, we may infer that they diverged from each other as they advanced forwards, in order to bring their broadest cutting surfaces into line. That they were opposed to teeth of a corresponding structure in the upper jaw is proved by the oblique chisel-like cutting surface of the more perfect incisor: and it is not without

interest to find that the presence of *dentes scalprarii* at the anterior part of the mouth has not been necessarily limited to Mammalia of small size.

The position of the pulps of these incisors, in close proximity with the anterior grinders, corresponds with the position of the pulps of the incisors in the upper jaw of the *Toxodon*, and indicates, in conjunction with the size of the pulps, that a considerable extent of the inferior incisors was lodged in the substance of the anterior part of the jaw. It is most likely that no vertically directed tooth would be developed in the part of the jaw so occupied by the curved bases of the incisors, and hence a diastema or toothless space would intervene between the molars and incisors of this lower jaw, as in the upper jaw of the *Toxodon*.

It is interesting, also, to observe, that as the deviations from the Rodent type, which occur in the cranium of the *Toxodon*, are the same, in some instances, as those which obtain in the Wombat; so we find a corresponding deviation in the size and relative position of the inferior incisors, which, as in the Wombat, terminate anterior to the molar teeth, instead of extending backwards beyond the last grinder, as in most of the true Rodents. The *Capybara* presents the nearest approach to this structure, the pulps of the inferior incisors being situated opposite the interspace of the first and second grinders.

The molar teeth, in this mutilated lower jaw, like those in the upper jaw of *Toxodon*, had persistent pulps, as is proved by the conical cavity at their base, as represented in fig. 3; they consequently required a deep socket, and a corresponding depth of jaw to form the socket and protect the pulps. In order to economise space, and to increase the power of resistance in the tooth, and perhaps, also, to diminish the effects of direct pressure on the highly vascular and sensible matrix, we find the molars and their sockets are curved, but in a less degree than those of the upper jaw of the *Toxodon*. They correspond, however, with the superior molars of the *Toxodon* in the antero-posterior diameter, in being small and simple at the anterior part of the jaw, and by increasing in magnitude and complexity as they are situated more posteriorly. They are, however, narrower from side to side; but supposing them to belong to the *Toxodon*, it would agree in this respect with most other large herbivorous mammalia;—the fixed surface for attrition in the upper jaw being from obvious principles more extensive than the opposed moveable surface in the lower jaw.

The *first* grinder, in the lower jaw here described (Pl. V. fig. 2), is of small size and simple structure, being surrounded with a coating of enamel of uniform thickness, and without any fold penetrating the substance of the tooth. It is more curved than any of the other molars, and appears to have differed from the external incisor only in its entire coating of enamel and direction of growth; it is interesting, indeed, to find so gradual a transition, in structure, from molar to incisive teeth,



as this jaw presents; for the robust incisors may here be regarded as representing molars simplified by the partial loss of enamel, and with a change in their direction.

In the *second* molar, we find an increase in the antero-posterior diameter, and in the length of the tooth, and the enamel at the middle of the outer side makes a fold which penetrates a little way into the tooth; the line of enamel, on the inner side, is slightly concave and unbroken.

The *third* molar presents an increase of dimensions in the same directions as the second; the enamel on the outer side of the tooth presents a similar fold, but it is directed a little more backwards.

In the *fourth* molar, besides a further increase of size, and a corresponding but deeper fold of enamel in the external side of the tooth, we have the grinding surface rendered more complicated by two folds of enamel entering the substance of the tooth from the inner side: these folds divide the antero-posterior extent of the tooth into three nearly equal parts; they are both directed obliquely forwards, half-way across the substance of the ivory.

The *fifth* molar presents the same structure as the fourth, which it exceeds only slightly in size.

In the *sixth* molar we have a proportionally greater increase of size in the antero-posterior diameter, which measures two inches; but the lateral diameter is but slightly augmented; its structure resembles that of the fifth.

As these grinding teeth by no means increase in the lateral diameter in the same proportion as in their antero-posterior diameter, the posterior ones present, but in a greater degree, the compressed form which characterizes the grinders of the upper jaw of the *Toxodon*.

It will be seen, however, that there is a difference in the structure of the grinders in this fragment of the lower jaw and those of the upper jaw of the *Toxodon*. In the lower grinders there are two folds of enamel proceeding from the inner side of the tooth into its substance, whilst in the upper grinders there is only one fold continued from the inner side; in the lower grinders there is also a fold of enamel reflected into the substance of the tooth from the outer surface, while in the upper grinders of *Toxodon* we find the enamel coating on the outer side of the tooth merely bent inwards, so as to describe, in the transverse section, a gently undulating line; fig. 7, Pl. V. is the grinding surface of the sixth molar, right side, upper jaw.

But this difference of structure is by no means incompatible with the co-existence of the two series of teeth in the same animal, since we find the grinders of the upper and lower jaws presenting differences of structure of equal degree in existing herbivorous species. If we examine the jaws of the Horse, for example, we shall find not only an equal amount of difference in the structure of the upper

and lower grinders, but that they deviate from one another in a very similar manner to that above described in the *Toxodon*. In this comparison attention should be confined to the course of the external enveloping layer of enamel, leaving out of consideration the central crescentic islands of enamel which constitute the additional complexity of the Horse's grinder. Viewing then the course of the external coat of enamel on the worn surface of the tooth, we find it describing on the outer side of the tooth in the upper jaw an undulating line,—a middle convexity being situated between two concavities; on the inner side of the tooth one fold of enamel penetrates to the middle of the tooth, and on each side of this there is a smaller fold. But in the lower jaw the line of enamel on the outer side of the tooth, instead of merely bending outwards midway in its course, is reflected a little way inwards; while on the opposite, or inner side of the tooth, the enamel sends two extensive folds into the substance of the tooth, opposite to the interspace of which the shorter fold projects from the outer side. Now, on the supposition that the fragment of the lower jaw here described belongs to the *Toxodon*, the kind and degree of difference in the complexity of the grinding surface of the teeth in the upper and lower jaw, are remarkably analogous to those which exist in the Horse. I have only further to remark that in the Horse the inflected folds of enamel, instead of being simple and straight with the two constitutive layers in apposition, as in the *Toxodon*, are irregular in their course, with *cœmentum* intervening between the constitutive layers, which also diverge from each other at their angle of reflection, so as to augment the amount of dense material which enters into the composition of the tooth.

Many analogous examples will readily occur to the experienced comparative anatomist. The Horse has been adduced as one to which reference can very readily be made; but I would also cite the Sumatran Rhinoceros, the skull of which, in the Hunterian collection, has already been alluded to. In this species the anterior grinders, in both jaws, are small and simple, and increase in complexity as they recede backwards. The third superior grinder (fig. 8, Pl. V.) presents a single fold of enamel, reflected obliquely forwards from the inner side half-way across the tooth; the outer line of enamel describes a simply undulating line. The opposite grinder of the lower jaw (fig. 9, Pl. V.) has only one-half the breadth of the upper one, but has its grinding surface further complicated by having two inflected folds of enamel from the inner side, and one shorter and broader fold from the outer side. This tooth, therefore, presents a close resemblance to one of the posterior grinders of the lower jaw of the *Toxodon*, but differs essentially in being of limited growth, and consequently in having fangs.\*

\* Besides the relation to *food requiring much comminution*, which teeth with persistent pulps bear, they are also connected with the *longevity of the individual*. The term of life in a herbivorous animal, with grinders



In speculating upon the nature of the organized substances which the teeth of the *Toxodon* were destined to grind down, we must not only take the structure of the tooth into consideration, but also the power of perpetual renovation, which will compensate for the defective quantity of enamel in the grinders of the *Toxodon*, as compared with those of the existing Ruminants and Pachyderms, whose grinders, when once completed, receive no further addition of dental substance at their base. The *Toxodon*, in this character of its dentition, participated in the same advantages with the *Capybara* and the *Megatherium*.

Although we have been enabled to observe the structure of the grinding teeth of the upper jaw of the *Toxodon* in two examples only; one, an insulated perfect grinder corresponding to the sixth alveolus on the right side, and the other, a portion of the last grinder of the left side remaining in the socket of the head previously described, yet from the relations subsisting between socket and tooth, a very satisfactory opinion may be formed of the structure of those teeth which are wanting, as well as of their size. It thus appears, that the grinders of the upper jaw of the *Toxodon*, are small and simple at the anterior part of the jaw, and that they increase (chiefly in antero-posterior extent) in size, as well as in complexity, as they recede backwards in the jaw. In this respect, as well as in size, the teeth, in the fragments of the lower jaw just described, exactly correspond. There is, however, a slight difference in the lateral diameter of the two sets of grinders, those of the lower jaw being narrower, as is usually the case, but not in the same degree as in the Horse or Ruminant. A greater difference obtains in the degree of curvature of the two sets of molars, those of the lower jaw, especially the posterior grinders, being much less bent than the corresponding teeth of the upper jaw. It is necessary to observe, also, that the convexity of the curve of the inferior grinders is directed outwards, as in the superior grinders; while in the Guinea Pig and Wombat, which have also curved grinders, the convexity is outwards in the lower jaw, and inwards in the upper jaw.

Nevertheless, if we take into consideration the close similarity which exists between the teeth of the upper jaw of the *Toxodon*, and those of this lower jaw in more essential points, as in their persistent pulps, their characteristic structure and form, the depth of their sockets, and their relative sizes and complexity; and when we consider how the depth of this lower jaw, and its narrowness in the transverse direction, corresponds with the characteristic form of the upper jaw of the *Toxodon*, and that to these resemblances is added an apparatus of incisors adequate to oppose the great dentes scalprarii of the upper jaw, the conclusion seems irresistible

of temporary growth, is, of necessity, dependent on the duration of these essential aids to nutrition; thus, a sheep generally wears down its grinders in twelve years, and its natural term of life is consequently limited to about that period.

ble, that the lower jaw, here described, must be referred, if not to the same, at least to a nearly allied species of *Toxodon*, as that to which the large cranium belonged.

Further researches in South America, it is hoped, will lead, ere long, to the completion of our knowledge of the osteology of this very remarkable and interesting genus of extinct mammiferous animals.

#### DESCRIPTION OF PARTS OF THE SKELETON OF

#### MACRAUCHENIA PATACHONICA;

*A large extinct Mammiferous Animal, referrible to the Order Pachydermata; but with affinities to the Ruminantia, and especially to the Camelidæ.*

IN the preceding pages the nature and affinities of a large extinct Mammal were attempted to be determined from the cranium and teeth exclusively: we come now to consider the remains of a quadruped consisting of bones of the trunk and extremities, without a fragment of a tooth or of the cranium to serve as a guide to its position in the zoological scale.

It may appear, even to anatomists and naturalists familiar with the kind of evidence afforded by a fossil fragment, that an opinion as to the relation of the present species to a particular family of Ruminants, formed without a knowledge of the important organs of manducation, must be vague and doubtful, but the evidence about to be adduced, will be regarded, it is hoped, as more conclusive than could have been *à priori* expected.

The portions of the skeleton of the animal—which, in relation to the affinity above alluded to, as well as from the length of its neck, I propose to call *Macrauchenia*\*—were discovered by Mr. Darwin in an irregular bed of sandy soil, overlying a horizontal accumulation of gravel on the south side of Port St. Julian: and independently of the circumstances under which they were found, their correspondence with each other in size, colour, texture and general character prove them to have belonged to one and the same individual.

These remains include two cervical vertebræ, seven lumbar vertebræ, all more or less fractured; a portion of the sacrum and ossa innominata; fragments of the left scapula; of the left radius and ulna, and left fore-foot; the left femur

\* *Maxpos longus*, αὐχην *cervix*: from the latter word Illiger derived *Auchenia*, his generic name of the Llama, Vicugna, &c.



nearly entire, the proximal and distal extremities of the left tibia and fibula; and a metatarsal bone of the left hind foot.

Before entering upon the description of these remains, a few observations may be advantageously premised on some of the distinguishing characters of the Camelidæ. It is well known that the Camels and Llamas deviate in their dentition, viz., in the presence of two incisors in the upper jaw, from the true Ruminants; and we cannot avoid perceiving that in this particular the direction in which they deviate tends towards the conterminous Ungulate Order, in which incisor teeth are rarely absent in the upper jaw. They also further deviate from the Ruminants and approach the Pachyderms in the absence of cotyledons in the uterus and fetal membranes; having, instead thereof, a diffused vascular villosity of the chorion, as in the sow and mare.

But besides these characters, by which, in receding from one type of hoofed mammalia, the Camelidæ claim affinity with another, there are many parts of their organization peculiar to themselves; of some of these peculiarities, the relation to the circumstances under which the animal exists, can be satisfactorily traced; in others, the connection of the structure with the exigencies of the species, is by no means obvious, and in this predicament stands the osteological peculiarity, which is immediately connected with our present subject—a peculiarity in which the Camelidæ differ not only from the other Ruminants, but from all other existing Mammalia, and which consists in the absence of perforations for the vertebral arteries in the transverse processes of the cervical vertebræ, the atlas excepted.

I may observe that what is described as a perforation of a single transverse process in a cervical vertebra is essentially a space intervening between two transverse processes, a rudimental rib, and the body of the vertebra. In the cold-blooded Saurians,—in which the confluence of the separate elements of a vertebra takes place tardily and imperfectly, if at all,—the nature of the so called perforation of the transverse process is very clearly manifested, as in the cervical vertebræ of the Crocodile, in which the interspace of the inferior and superior transverse processes is closed externally by a separate short moveable cervical rib. In the *Ornithorhynchus paradoxus* the vertebra dentata also preserves throughout life this condition of its lateral appendages: in other Mammalia it is only in the foetal state that the two transverse processes are manifested on each side with their extremities united by a distinct cartilage, which afterwards becomes ossified and anchylosed to them.

In the Hippopotamus the inferior transverse process sends downwards a broad flat plate extended nearly in the axis of the neck, but so obliquely, that the posterior margins of these processes, in one vertebra, overlap the anterior ones of the succeeding vertebra below, like the cervical ribs in the Crocodile; the same structure obtains in many other mammalia, especially in the Marsupials. In the

Giraffe, the inferior transverse processes are represented by relatively smaller compressed laminae, projecting obliquely downwards and outwards from the anterior and inferior extremity of the body of the vertebra. The superior transverse processes in this animal are very slightly developed in any of the cervical vertebræ, and the perforation for the vertebral artery is above and generally in front of the rudiment of this process, being continued as it were through the side of the substance of the body of the vertebræ.

In the long cervical vertebræ of the Camel and Llama, the upper and lower transverse processes are not developed in the same perpendicular plane on the sides of the vertebræ, but at some distance from each other; the lower transverse processes (*a*, fig. 1, Pl. VI.; *a*, fig. 1, 3, 4, Pl. VII.) being given off from the lower part of the anterior extremity of the body of the vertebra; the upper ones (*b*, fig. 1, Pl. VI.; *a*, fig. 1, 3, 4, Pl. VII.) from the base of the superior arch near the posterior part of the vertebra, or from the sides of the posterior part of the body of the vertebræ. The extremities of these transverse processes do not become united together, but they either pass into each other at their base, or continue throughout life separated by an oblique groove (as in fig. 1, Pl. VI.) This groove would not, however, afford sufficient defence for the important arteries supplying those parts of the brain which are most essential to life; and, accordingly the vertebral arteries here deviate from their usual course, in order that adequate protection may be afforded to them in their course along the neck. From the sixth to the second cervical vertebræ inclusive in the *Auchenia*, and from the fifth to the second inclusive in the *Cameli*,\* the vertebral arteries enter the vertebral canal itself, along with the spinal chord, at the posterior aperture in each vertebra, run forwards on the outside of the dura mater of the chord between it and the vertebral arch, and when they have thus traversed about two-thirds of the spinal canal, they perforate respectively the superior vertebral laminae, and emerge directly beneath the anterior oblique or articulating processes, whence they are continued along with the spinal chord into the vertebral canal of the succeeding vertebra, and perforate the sides of the anterior part of the superior arch in like manner; and so on through all the cervical vertebræ until they reach the atlas, in which their disposition, and consequently the structure of the arterial canals, resemble those in other Ruminants.

The two cervical vertebræ of the *Macrauchenia* present precisely the struc-

\* In the seventh cervical vertebra of the Camel, as in many other Mammalia, there is no perforation in any part for the vertebral arteries. In a Vicugna, I find the same structure; but in a Llama, the side of the body of the seventh cervical vertebra is perforated longitudinally on the right side. In the Camel, the vertebral arteries pierce the sixth cervical vertebra, immediately below the superior transverse processes, and pass obliquely to the anterior aperture of the cervical canal, where they emerge beneath the anterior oblique processes, and then enter the spinal canal of the fifth cervical vertebra, as described in the text.



ture and disposition of the bony canals for the vertebral arteries which are peculiarly characteristic of the Camelidæ among existing Mammalia. In Plate VI. fig. 2, the groove and orifices of the canal for the vertebral artery are shown in a section exposing the spinal canal: in Plate VII. figures 1 and 3 exhibit the orifices at the commencement of the arterial canals, as seen in a posterior view of the vertebræ; in figs. 2 and 4, the terminations of the same canals are shown, in the anterior view of the same vertebræ; the smaller figures (3 and 4) are taken from the fourth cervical vertebra of a Llama. The vertebræ of the *Macrauchenia* also closely resemble the middle cervical vertebræ of the *Vicugna* and *Llama* in their elongated form; approaching the Auchenian division of the Camelidæ, and deviating from the true Camels in the relations of the length of the body of the vertebra to its breadth and depth, and in the much smaller size of the inferior processes. Excepting the Giraffe, there is no existing mammal which possesses cervical vertebræ so long as the *Macrauchenia*; but the cervical vertebræ of the Giraffe, differ in the situation of the perforations for the vertebral arteries, and in the form of the terminal articular surfaces, as will be presently noticed.

Both of the cervical vertebræ of the *Macrauchenia* here described, are of the same size, each measures six inches and a half in extreme length, two inches, ten lines in breadth, and two inches, four lines in depth. In the Giraffe and the Camelidæ, the spinous processes are thin laminæ of considerable extent in the axis of the vertebra, but rising to a very short distance above the level of the vertebral arch: the spinous processes have the same form in the corresponding vertebræ of the *Macrauchenia*, but present a still greater longitudinal extent; they commence at the interspace of the anterior oblique processes, and extend to opposite the base of the posterior oblique processes; the upper margin describing a gentle curve, as shown in fig. 1, Pl. VI. The transverse processes also present the form of slightly produced, but longitudinally extended, laminæ: their disposition is essentially the same as in the Camelidæ, but more nearly corresponds with the modifications presented by the Auchenian. The inferior transverse processes,—those which are alone developed in fish, but which are not present in any other vertebræ save the cervical, in mammalia,—these processes in the *Macrauchenia* are continued from the sides of the under surface of the anterior part of the body of the vertebra; their extremities being broken off, it cannot be determined how far they extended from the body of the vertebræ, but they gradually subside as they pass backwards: the superior transverse processes are continued outwards from the sides of the posterior part of the body of the vertebra, and gradually subside as they advance forwards along three-fourths of the body of the vertebra: they are not continued into the anterior and inferior transverse processes, as in the *Vicugna*, but are separated therefrom by a narrow and shallow groove. The articular, or oblique processes, closely resemble those of the Auchenian

in form, and in the direction of the articular surfaces; those of the anterior processes looking inwards and a little upwards; those of the posterior, outwards and a little downwards.

In the *Macrauchenia* a small longitudinal process (*c*, fig. 2, Pl. VII.) is given off immediately below the base of the anterior oblique process; this structure is not observable in any of the cervical vertebræ of the Giraffe or Camelidæ.

In the form of the articulating surfaces of the bodies of the vertebræ the *Macrauchenia* deviates from the Giraffe and Camel, but resembles the Auchenian. In the Giraffe and Camel the anterior articulating surface is convex and almost hemispheric, the posterior surface is proportionally concave, so that the cervical vertebræ are articulated by ball and socket joints; yet not, as in most Reptiles, with intervening synovial cavities, but by the concentric ligamentous intervertebral substance characteristic of the Mammiferous class. In the *Llama* and *Vicugna*, the degree of convexity and concavity in the articular surface of the bodies of the cervical vertebræ is much less than in the Camels; and in consequence they carry their necks more stiffly and more in a straight line. In *Macrauchenia* the anterior articulating surface (fig. 2, Pl. VII.) presents a still slighter convexity than in the *Llama* (fig. 4, Pl. VII.), and the posterior surface (fig. 1, Pl. VII.) presents a correspondingly shallower concavity. The form of the extremities of the body of the vertebræ, especially of the posterior, is sub-hexagonal, the breadth being to the depth as eight to five. The sides and under part of the vertebræ are slightly concave; on the inferior surface there are two ridges, continued forwards from the posterior margin of the vertebra, each situated about an inch distant from the middle line; they converge as they pass forwards, and are gradually lost in the level of the vertebra; their greatest elevation does not exceed half an inch. In the Auchenian there is a longitudinal protuberance in the mesial line, instead of the two ridges. The two long cervical vertebræ of the *Macrauchenia* are also characterized by the maintenance of an almost uniform diameter of the body, both in its vertical and transverse extent; the cervical vertebræ of the *Vicugna* come nearest to them in this respect; those of the Camel deviate further in the large excavation at the under part of the body.

The long vertebral or spinal canal offers a slight enlargement at the two extremities; this structure which is generally in the ratio of the extent of motion of the vertebræ on each other is more marked in the Camel, where the form and mode of articulation of the bodies of the vertebræ are designed to admit of a free and extensive inflection of the cervical vertebræ; and the result of this structure is very obvious in the sigmoid flexure of the neck in the living animal. In the Auchenian, on the contrary, the neck is carried less gracefully erect and in an almost straight line, and the form of the vertebræ and the nature of their joints correspond, as we have seen, to this condition. From the length of the bodies of the



cervical vertebræ of the *Macrauchenia*, and the almost flattened form of their anterior and posterior articular surfaces, I infer that the long neck in this singular quadruped must have been carried in the same stiff and upright position as in the *Vicugna* and *Guanaco*.

The following individual differences are observable in the two cervical vertebræ of the *Macrauchenia*;—in the posterior one the superior arch is wider and with thicker parietes, the body is more concave below, and the inferior transverse processes have a more lengthened origin.

Not a fragment of dorsal vertebræ, ribs or sternum, is included in the collection of the bones of the *Macrauchenia*; but fortunately seven lumbar vertebræ, forming a consecutive series of the same individual as that to which the cervical vertebræ belonged, were obtained, all more or less fractured, but all sufficiently perfect to demonstrate their true nature. These vertebræ, although not possessing such distinctive characters as the cervical, contribute by no means an unimportant element towards the illustration of the osteology of the *Macrauchenia*, and support the view which I have taken of its affinities; for, although, as will be seen from the structure of its extremities, this animal must be referred to the Order *Pachydermata*, yet no existing species of that order has more than six lumbar vertebræ; whilst among the *Ruminants* it is only in the *Camel*, *Dromedary*, *Llama* and *Vicugna*, that the lumbar vertebræ reach the number seven,—the same number which characterizes the extinct annectant species in question. The dimensions of the vertebræ in the *Macrauchenia* present the same relations to the two cervical vertebræ above described, which the lumbar vertebræ of the *Vicugna* bear to the third, fourth, or fifth of its cervical vertebræ. But here we begin to discover modifications of form, in which the *Macrauchenia* deviates from the *Camelidæ*, and approaches the *Pachyderms*, as the *Horse* and *Hippopotamus*; and these indications become stronger as the vertebræ approach the sacrum.

In the *Camel*, as well as in the *Horse* and *Hippopotamus*, the bodies of the lumbar vertebræ diminish in vertical extent, or become flatter, as they approach the sacrum; but this character is more strongly marked in the *Macrauchenia* than in either of the above species. But in the *Camelidæ* the transverse processes of the lumbar vertebræ, are elongated, flattened, and narrow, resembling ribs, except that they are nearly straight; and this is more particularly the case with the transverse processes of the last lumbar vertebræ, which are the narrowest of all in proportion to their length, and stand freely out without touching the sacrum. The transverse processes of the lumbar vertebræ of the *Giraffe* resemble those of the *Camel*, but are relatively smaller and shorter. In the *Hippopotamus* the transverse processes of the lumbar vertebræ are much broader in proportion to their length than in any of the *Ruminants*, and they increase in breadth to the

last lumbar vertebra, which presents in addition, the following characters; each transverse process sends off from its posterior margin a thickened and transversely elongated protuberance, which supports a flattened articular surface adapted to a corresponding surface on the anterior part of the transverse process of the first sacral vertebra: it likewise presents on its anterior edge a flattened and rough surface, which is closely attached by ligamentous substance to the opposite part of the transverse process of the penultimate lumbar vertebra. A similar structure exists in the last two lumbar vertebræ of the *Rhinoceros*, *Tapir*, and *Horse*. In the latter animal, ankylosis of these articulating surfaces of the lumbar and sacral vertebræ generally takes place with age, and, judging from the character of the same surfaces in the *Hippopotamus*, the motion of its lumbar vertebræ upon the sacrum may in like manner become ultimately arrested.

Now in the *Macrauchenia*, as in the *Pachyderms* above cited, the transverse processes of the last lumbar vertebræ are of considerable thickness and extent, and are joined by enarthrosis to the transverse processes of the sacrum; but the bony structure of these joints would indicate that they were not subject to be obliterated by ankylosis. The articular surfaces which project from the posterior part of the transverse processes of the last lumbar vertebræ present a regular and smooth concavity, adapted to a corresponding convexity in the transverse processes of the first sacral vertebra. These articulating surfaces have evidently been covered with smooth cartilage; they present a pretty regular transverse ellipsoid form. A view of the three joints by which, independently of the two oblique processes, the last lumbar vertebra of the *Macrauchenia* was articulated with the sacrum, is given in Plate VIII. fig. 1. The transverse processes of the posterior lumbar vertebra, besides their agreement with those of the *Horse* and *Hippopotamus* in the structure just described, also correspond with them in general form, and deviate remarkably from those of the *Camelidæ* in their great breadth.

It will be seen that the articulations on the body and transverse processes of the last lumbar vertebra of the *Macrauchenia* differ from the corresponding articular surfaces of the *Horse*, inasmuch as the middle surface is convex, while the two lateral ones are concave, and these are moreover relatively larger than either in the *Horse* or *Hippopotamus*: by this structure the trunk was more firmly locked to that segment of the vertebral column, which receives and transmits to the rest of the body the motive impetus derived from the hinder extremities, which are in all quadrupeds the chief powers in progression; while at the same time the shock must have been diminished by the great extent of interposed elastic cartilages; and a certain yielding or sliding motion would be allowed between the lumbar vertebræ and sacrum.

The anterior oblique processes of the lumbar vertebræ of the *Macrauchenia*

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(fig. 4, Pl. VIII.) have concave articular facets turned towards, and nearly continued into, each other at their lower extremities; so as to form together a deep semilunar notch, into which the corresponding convex articular surfaces of the posterior oblique processes of the adjoining vertebra (fig. 3, Pl. VIII.) are firmly locked. In the close approximation of the two anterior concave articular facets, which are separated from each other only by a vertical ridge, and a rough surface of about three or four lines in breadth, the lumbar vertebrae of the *Macrauchene* resemble those of the Horse, and differ from those of the Camel-tribe and Ruminants generally, in which those surfaces are wider apart. In the hook-like form, however, of these articular processes the lumbar vertebrae of the *Macrauchene* differ from those of the Horse; and resemble those of many Ruminant species, and of the *Anoplothere*;<sup>\*</sup> but the degree of concavity of the articulating surface is not so great in the *Macrauchene*. It would be interesting to determine the relations which the lumbar vertebrae of the *Macrauchene* bear to those of the *Palæothere*; but the indication which Cuvier gives of the single lumbar vertebra, of which he had cognizance in the latter genus† is too slight to enable me to enter upon the comparison.

The whole length of the lumbar region in the *Macrauchene* is twenty inches. When the bodies of these vertebrae are naturally adapted together, they form a slight curve, indicating that the loins of the *Macrauchene* were arched, or bent downwards towards the sacrum. That the lumbar vertebrae were rigidly connected together, or but slightly flexible, is evident from the flatness of the articular surfaces of the vertebral body, and by the circumstance of ossification having extended along the anterior vertebral ligaments, and produced an ankylosis between the fourth and fifth lumbar vertebrae; (fig. 2, c, Pl. VIII.) This kind of ossification is frequent in aged horses, and I have seen an example of a similar ankylosis of the lumbar vertebrae, by abnormal deposition of bone in their anterior ligaments, in the skeleton of a Hippopotamus preserved in the Senkenbergian Museum, at Frankfort.

In preparing the preceding account of the cervical and lumbar regions of the vertebral column of the *Macrauchene*, I have felt frequently a strong desire to enter into a comparison between them and the corresponding vertebrae of the extinct Pachyderms of the Paris Basin. Some of these, as the *Anoplotherium gracile*, in the length and slenderness of the cervical vertebrae, resemble both *Auchenia* and *Macrauchenia*; others, as the *Palæotherium minus*, and probably the rest of the genus, resemble the *Camelidae* and *Macrauchenia* in having seven lumbar vertebrae. Cuvier points out the resemblance which the atlas of the *Anoplothere* bears to that of the Camel, and especially of the Llama;‡ but he

\* Cuvier, Ossements Fossiles, iii. p. 238.

† Loc. cit. p. 234.

‡ Loc. cit. p. 235.

expressly notices the existence of the canals for the vertebral artery in the fifth or sixth cervical vertebra of the *Anoplotherium commune*.<sup>\*</sup> Do the cervical vertebrae—say from the third to the sixth inclusive—of the *Palæotherium* present an imperforate condition of their transverse processes, or exterior part of their sides? Cuvier, who seems not to have been aware of this peculiarity in the *Camelidae*, merely notices the absence of these arterial foramina in the last cervical vertebra of the *Palæotherium minus*,† which, unfortunately for the comparison I am desirous of establishing, is that which most commonly presents this imperforate condition in the Mammalia generally. As, however, the cervical vertebrae of the *Palæothere* had the anterior articular surface of the body convex, and the transverse processes produced into descending laminae, it is most probable that they corresponded with the cervical vertebrae of the typical Pachyderms in the condition of their arterial foramina.

The sacrum and ossa innominata in the present specimen of *Macrauchenia* are very imperfect; but sufficient is preserved to show that the sacrum was ankylosed to the ilia: the lower boundary of this ankylosis is marked below by an external ridge, and by vascular canals and grooves in the substance of the bone, as in the Hippopotamus. The body of the sacrum is lost, but the smooth articular convexities upon the transverse processes adapted to the articular depressions of the last lumbar vertebra are fortunately preserved.

The remains of the anterior extremity of our *Macrauchenia* include fragments of a left scapula; the proximal extremities of the ankylosed bones of the right antibrachium; the metacarpal and most of the phalangeal bones of the right fore-foot. The first-mentioned fragments, include the head and neck of the scapula, a small part of its body with the beginning of the spine, the coracoid process, and the nearly entire glenoid cavity. This articular surface (fig. 2, Pl. IX.) resembles in its general form, and degree of concavity, that of the Camel and Rhinoceros, and is deeper than in the Hippopotamus. The coracoid process is represented by a slightly produced rough, thick, and obtuse tuberosity, situated closer to the glenoid cavity than in the *Camelidae* or *Rhinoceros*, and having almost the same relative position and size, as in the *Palæotherium crassum*. The superior border or costa of the scapula presents much variety in the Ungulate quadrupeds with which we have to compare the *Macrauchenia*. In the Ruminants its contour forms behind the coracoid a concave sweep, which advances close to the spine of the scapula. In the Camel and Horse the marginal concavity is shallower, and the distance of the superior costa from the spine of the scapula is greater; the extent of the supra-spinal fossa increases in the true Pachyderms, and the *Macrauchene* agrees with them in this structure. In the Tapir, how-

\* Loc. cit. p. 237.

† Loc. cit. p. 232.



ever, the contour of the superior costa is broken by a deep round notch immediately behind the coracoid: in the Hippopotamus this process arches in a slight degree backward over a corresponding but wider and shallower notch. In the *Palæotherium crassum* the concavity of the superior costa, behind the coracoid, is as slight as in the Rhinoceros; but in the *Macrauchenia* the superior costa of the scapula begins to rise or stretch away from the parallel of the spine, immediately behind the coracoid process. The modifications of the spine of the scapula which characterize respectively the Ruminants and Pachyderms have been clearly and concisely set forth by Cuvier, who at the same time points out the exceptional condition which the *Camelidae* present in the production of the acromial angle. It was with peculiar interest and care, therefore, that I reunited all the fragments of the scapula of the *Macrauchene*, in the hope of gaining from this part of the skeleton as decisive evidence of an affinity to the Camel as the cervical vertebrae had afforded. It unfortunately happens, however, that the part of the scapula most important in this comparison is broken off; yet from this very circumstance, combined with a slight inclination forwards of the anterior margin of the spine immediately beneath the fractured acromion, and from the thickness of the fractured surface, we may infer that the acromial angle of the spine was more produced than in the ordinary Ruminants, although evidently in a less degree than in the Camel tribe. The *Macrauchenia*, however, surpasses these aberrant Ruminants, and equals the Pachyderms in the elevation and extent of its scapular spine: but this process commences about half an inch behind the glenoid cavity, and rises at once to the height of three inches above the plane of the scapula; in which structure we may trace the same tendency to the Ruminant type, as is manifested in the scapula of the Hippopotamus and *Anoplotherium*; for in most other Pachyderms the spine increases gradually from its extremities to the middle part. The anterior margin of the spine beneath the short acromion is perforated by an elliptical fissure measuring ten lines, by three lines. The extent of the spine which is preserved, measures eight inches and a half; it is a thin and nearly straight plate of bone, expanding into a thick and rugged upper margin, which slightly over-arches the inferior fossa. (fig. 1, Pl. IX.) In its general form and proportions the spine of the scapula in *Macrauchenia* presents the nearest resemblance to that of the Hippopotamus; but its origin is closer to the articular surface of the scapula than in this, or any other Pachydermal or Ruminant genus.

The portion of the antibrachium of the *Macrauchenia* which is preserved, presents a condition of the radius and ulna intermediate to those which respectively characterize the same bones in the Pachyderms and Camels. In the former the radius and ulna are separate bones, united in the prone position by ligament, yet so that the movement of supination cannot be performed; in the

ordinary Ruminants they are partially joined by bony confluence, which rarely extends to the proximal extremities; in the Camel and Llama the ankylosis of the radius and ulna is so complete, that no trace of their original separation can be perceived, and the olecranon appears but as a mere process of the radius.

In the *Macrauchenia* the ankylosis of the radius and ulna is also complete, but the boundary line of the two originally distinct bones is very manifest, and the proportion which each contributes to the great articulating surface for the distal end of the humerus is readily distinguishable. About a sixth part of this surface is due to the head of the radius, which enters into the composition of the anterior and outer part of the articulation, and its extent is defined by a depressed line describing a pretty regular curve, with the concavity directed forwards and a little outwards. (a, fig. 1, Pl. X.) Just below the articular surface a strong triangular rugged protuberance projects from the front of the head of the radius, for the attachment of the tendon of the biceps. The line of separation of the radius and ulna is indicated on the inner side of the head of the radius by a deep and narrow fissure extending downwards from below the anterior part of the articulating surface; and on the outer side by a broad groove leading upwards to a deep pit near the proximal end of the antibrachium. We may see by the direction of the head of the radius which is thus defined, that it crosses obliquely in front of the ulna, as in the Elephant, Hippopotamus, and other Pachyderms, and that the bones are ankylosed in the prone condition: below this fissure and groove, which mark the interosseous line, the radius and ulna become blended together into one compact bone, which is flattened from before backwards, with a well marked ridge on the outer side; and excavated by a single medullary cavity, the compact walls of which present a general thickness of one-third of an inch.

The proximal articular surface or sigmoid cavity of the antibrachium, constituted as above described, resembles that of the *Palæothere*, *Tapir*, and the generality of the Pachyderms in having two depressions, instead of three, as in the *Anoplothere*, and Ruminants. The Hippopotamus has a slight tendency to the latter structure, which is also less marked in the Camel than in the ordinary Ruminants. In its general form the sigmoid cavity of the *Macrauchene* resembles that of the Hippopotamus more than that of the Camel. In the Camel this articular surface is traversed transversely by a broad, shallow, and slightly roughened tract, which divides the smooth surface of the joint into two parts, one forming the anterior horizontal surface due to the conjoined radius and ulna, the other forming the vertical concave surface on the anterior part of the base of the olecranon. In the Hippopotamus there is, as it were, an attempt at a similar division of the articulating surface at the proximal end of the antibrachial bones; a deeper and rougher depression encroaches upon the articulation from its outer side, but stops when it has reached half-way across. In the



Macrauchenia the roughened surface, (*b.* fig. 1, Pl. X.) commencing also at the outside, extends only one-third of the way across the articular surface: it is, however, as shallow as in the Camel. The articular surface on the anterior part of the base of the olecranon is broader in the Hippopotamus than in the Camel; but in the Macrauchene it is twice as broad as in the Hippopotamus. The size of the olecranon in the Macrauchene exceeds that of the Hippopotamus, and *a fortiori* that of the Camel: indeed in its general magnitude the Macrauchenia must have fully equalled the largest Hippopotamus; but it no doubt had a more shapely, and less broad and bulky trunk. The olecranon of the Macrauchenia differs in shape, both from that of the Camel and Hippopotamus; it terminates above in a three-sided cone with an obtuse apex; and presents a well marked protuberance at the outer side of the base, which is not present in either the Camel or Hippopotamus. There is also a strong rugged ridge on the back part of the olecranon which makes an angle before sinking into the level of the ulna below.

The confirmation of the close affinity of the Macrauchenia to the Pachydermatous Order, which the structure of the cervical vertebræ alone might have rendered very doubtful, is afforded by the bones of the right fore-foot (Pl. XI.); these are fortunately in so perfect a condition, as to make it certain that this interesting quadruped had three toes on the fore-feet, and not more; and that the fully developed metacarpal bones are distinct, and correspond in number with the toes, and are not ankylosed into a single cannon bone, as in the Ruminants. The bones preserved are the metacarpals, proximal phalanges, and middle phalanges of each of the three toes, and the distal phalanx of the innermost toe.

The proximal end of the innermost metacarpal bone presents three articular surfaces; the middle facet is the largest, and the two lateral ones slope away from it at an angle of 45°. The middle facet is broad and slightly convex in front, narrow and concave behind; the distal articular surface of the trapezoides must have corresponded with this surface; the outer facet is narrow, flat, extends from the fore to the back part of the head of the bone, and must have been adapted to a corresponding surface on the os magnum; the inner facet is the smallest, presents a triangular form, and is situated towards the back part of the head of the metacarpal bone; it indicates the existence of a rudimental metacarpal bone, or vestige of a pollex. Below the outermost of the lateral surfaces there is a crescentic articular surface with its concavity directed outwards and downwards (fig. 2, Pl. XV.), against which a corresponding convex articular surface of the middle metacarpal abuts, (fig. 3, Pl. XV.) External to this surface the proximal end of the middle metacarpal bone presents two articular surfaces for the carpus; the larger one, which was adapted to the os magnum, is hori-

zontal, broad and convex before, narrow and concave behind; the outermost facet is a small triangular surface inclined downwards to the level of the articulating surface of the outermost metacarpal. It also presents a posterior vertical articular surface for a sesamoid bone. The proximal extremity of the outer metacarpal bone is joined to the middle metacarpal, not by one semilunar surface, but by two separate articulations of small size (fig. 4 and 5, Pl. XV.); it presents a single large slightly convex articular surface for the os magnum, of an irregular semicircular form, with the convexity of the curve turned outwards.

The metacarpus increases in breadth as it approaches the phalanges; the two lateral metacarpals bending slightly away from the middle one, and expanding towards their distal extremities: the middle bone presents a symmetrical figure except at its proximal extremity (fig. 2, Pl. XI.) The distal articulating facet of each of the metacarpal bones extends so far upon both the anterior and posterior surfaces as to describe more than a semi-circle (fig. 3, Pl. XI.); in the two lateral metacarpals it is traversed throughout by a longitudinal convex ridge dividing it into two equal lateral parts; the ridge is most produced on the posterior half of the joint (fig. 4, Pl. XI.): in the middle metacarpal this ridge subsides before it reaches the anterior part of the articular surface.

The proximal extremity of the middle proximal phalanx presents a posterior notch corresponding to the above partially developed ridge: the proximal extremities of the lateral phalanges are traversed by a middle longitudinal depression, and two lateral shallow concavities (fig. 6, Pl. XI.); but these are of such an extent as to be in contact with only a part of the convexity above, which therefore was doubtless adapted to a sesamoid bone on each side of the longitudinal ridge. The structure of the above described joints proves that the motion of the toe upon the metacarpus was much freer and more extensive than in the Rhinoceros, which is the only existing Ungulate mammal which presents the tridactyle structure in the fore-foot. In this species the metacarpo-phalangeal articulations exhibit only a slight trace of the longitudinal ridges and grooves which are confined to the posterior part of the joint; these are more developed in the *Camelidæ*; but the Hog and Horse in this respect approach nearer to the Macrauchene, though the structure of the metacarpo-phalangeal joints in the Hog falls far short of the compactness and strength combined with freedom of play in flexion and extension which distinguish those of the Macrauchene. The *Palæotherium medium* most resembles the Macrauchene in the structure of the trochlear metacarpo-phalangeal joints; but both in this species,\* and the *Pal. crassum*† the articular surface at the distal end of the metacarpal is relatively narrower than in the Macrauchenia; moreover all the species of the extinct Palæothere differ from the Macrau-

\* See Ossem. Fossiles, Pl. XX. fig. 3.

† Loc. cit. Pl. XXII. fig. 6.



chene in the greater size and strength of the middle as compared with the lateral metacarpals.

The articulation at the distal extremity of the proximal phalanges (fig. 5, Pl. XI.) is simple, and not divided into two pulleys by a longitudinal ridge; it is slightly concave from side to side; but in its extent upon the anterior and posterior surfaces of the bone indicates a freedom of flexion and extension of the toes, which harmonizes with the structure of the joint above.

The proximal articulating surfaces of the second phalanges (fig. 7, Pl. XI.) corresponds of course to those to which they are adapted; they are, however, characterized by sending upwards an obtuse process from the middle of their anterior margin. The distal articulating surfaces (fig. 8, Pl. XI.) resemble those of the proximal phalanges, but extend further upon the back part of the phalanx than the front, indicating the more horizontal position of the second phalanges.

The last phalanx, does not resemble the neatly defined ungulate phalanges of the Ruminantia, and Solipedia, but has the irregular form characteristic of those of the Pachydermata. It is wedge-shaped, broader than it is long, with a rugged surface, except where it plays upon the distal end of the second phalanx, where it is slightly concave in one direction, and convex in the other, (figs. 7 and 9, Pl. XI.) A portion of this phalanx extends backwards behind the articular surface, as in the corresponding bone of the Palæothere and Rhinoceros.

The femur of the Macrauchenia (fig. 1, Pl. XII.) is full two feet in length, and consequently longer than in any known Camel or Rhinoceros; as compared with its transverse diameter it is much longer than the femur of the latter animal: in the proportion of its breadth to its length, and the expansion of its extremities as compared with the diameter of the shaft, it more resembles that of the Camel. The femur of the Giraffe deviates from that of the Macrauchenia in the excessive expansion of its distal extremity. But the most striking evidence deducible from this bone, of the affinity of the Macrauchenia to the true Pachydermatous type is afforded by the evident traces of a third trochanter, the outline of which is conjecturally restored in the figure. Of the Pachyderms which have this characteristic structure, the extinct Palæothere offers the nearest resemblance to the Macrauchene in the general form and structure of the femur.

The head of the femur in the Macrauchene (fig. 2, Pl. XII.) presents the form of a pretty regular hemisphere; it is less flattened above, and is directed more obliquely inwards than in the Palæothere: the neck supporting it does not project so far from the shaft as in the Palæothere or Tapir, but farther than in the Camel. The great trochanter rises above the level of the head; in which structure and in the depression between the head and trochanter, the femur of the Macrauchene offers a character intermediate between the Tapir or Palæothere, and the Camel. The lesser trochanter is a slight projection from a ridge

of bone which is continued from the under part of the head of the femur to the inner surface of the shaft. In the Palæothere the lesser trochanter is situated more towards the posterior surface of the femur; so that, in this particular, the Macrauchene approaches nearer to the Camel. Cuvier makes no mention of the condition of the depression for the *ligamentum teres* in the Palæothere. Among existing ordinary Pachyderms the Hippopotamus presents no trace of the insertion of a *ligamentum teres* in the head of the femur; in the Camel the place of its insertion is indicated by a well-marked circumscribed pit; in the Tapir a similar circular depression is situated close to the inferior margin of the articular convexity. The ligament was undoubtedly present in Macrauchenia, but the place of its insertion is a broad and deep notch leading from the under and back part of the head of the bone a little way into its articular surface: this I regard as another of those interesting transitional structures with which the remains of the Macrauchenia, few and imperfect though they unfortunately are, so freely abound.

The femur of Macrauchenia, in the flatness of the back part of its neck, and the elongated form of the post-trochanterian depression, resembles that of the Camel rather than that of the Palæothere; and the same resemblance is shown in the cylindrical figure, straightness, and length of the shaft. The depth of the trochanterian depression, and the incurvation of the strong ridge continued downwards from the great trochanter are individual peculiarities in the Macrauchenia.

A great part of the third trochanter is broken off; but from the remains of its base we see that it had the same relative size as in the Palæothere; but it is situated at the middle of the shaft of the femur, and consequently lower down than in the Palæotheres and Tapirs. In the general form and relative size of the condyles at the distal extremity of the femur (fig. 3, Pl. IX. and XII.) the Macrauchene is intermediate to the Camel and Palæothere, but resembles more the latter. In the articular surface for the patella, it deviates somewhat from the Palæothere, having this part longer in proportion to its breadth, more regularly and deeply concave from side to side, and with its lateral boundaries more sharply defined. In all these points the Macrauchene approaches the Camel: the same affinity is shown in the protuberance above the inner condyle; but in the extent of the posterior projection of this condyle (fig. 3, Pl. IX.) it exceeds the Camel and Palæothere, and displays an intermediate structure between these species and the Hippopotamus.

There is a rough crescentic depression above the outer condyle where the *linea aspera* begins to diverge; the corresponding depression is deeper in the Hippopotamus, while in the Camel it is represented by a roughened surface only, which is not depressed. In the fossa between the rotular articulation and the external condyle the Macrauchene resembles the Camel: the interspace of the



condyles is relatively wider than in the Camel, and the process above the inner condyle is more angular; in both these respects the *Macrauchene* inclines towards the *Palæothere*.

In the structure of the bones of the leg of the *Macrauchenia* we find the same transitional character which is afforded by the definable limits of the anchylosed bones of the fore-arm. In the *Pachyderma* the fibula is an entire and distinct bone. In the *Ruminantia*, with the exception of the small Musk-deer, and, in an inferior degree, the Elk, the fibula appears only as a short continuous process sent down from the under part of the external condyle of the tibia. In the Camel tribe the only trace of the fibula in the bones of the leg, is this process in a still more rudimental state. In the *Macrauchenia* the fibula is entire, but is confluent with the tibia through nearly its whole extent: the proximal part of the fibula is well defined; its head is anchylosed to the outer condyle of the tibia, but the shaft is continued free for the extent of nearly two inches, and then again becomes confluent with the tibia, forming apparently the outer ridge of that bone. About five inches from the distal end of the tibia this outer ridge becomes flattened by being, as it were, pressed against the tibia, and the anterior and posterior edges are raised above the level of the tibia; beyond this part the limits of the fibula begin again to be defined by deep vascular grooves. The outer side of the distal end of the fibula is excavated by a broad tendinous groove. The fibula and tibia are distinct bones in both the *Palæothere* and *Anoplothere*, as in the *Pachyderms*. It is to the former genus, however, especially *Pal. magnum*, that the *Macrauchene* presents the nearest approach in the general form of the tibia, the principal bone of its leg: but in the *Macrauchene* the tibia is relatively shorter, and thicker, and is straighter and less expanded at its extremities, especially the upper one, than in any of the *Palæotheres*.

The mesial boundaries of the two superior articulating surfaces of the tibia are raised in the form of ridges, which are separated by a deep groove; of these ridges the external is the highest, as in *Pal. magnum*: but the articular surfaces in the *Macrauchene* slope away from these ridges more than in the *Palæotheres*. The rotular or anterior tuberosity of the tibia is more produced, and rises higher than in the *Palæotheres*; the ridge continued downwards from this process is more marked in the *Macrauchene*, and its limits are better defined: the shaft of the tibia below the ridge is also more flattened in the antero-posterior direction than in the *Palæothere*. The configuration of the back part of both proximal and distal extremities of the tibia are so clearly and accurately given in figures 2 and 3, Pl. XIII., as to render verbal description unnecessary. Neither the text nor the figures in the 'Ossemens Fossiles' afford the means of pursuing the comparison between the *Macrauchene* and *Palæothere* in these particulars; and I proceed,

therefore, to the consideration of the inferior articulating surface of the bones of the leg (fig. 4, Pl. XIII.)

Since, of the hind foot, we possess in the present collection only a single tarsal and metatarsal bone, the structure of the distal articular surface of the tibia is attended with peculiar interest, because we are taught by Cuvier that it reveals to us in the Ungulate animals the didactyle or tridactyle structure of the foot. In the *Ruminants* this articular surface is nearly square, and extended transversely between two perpendicular malleoli, while in the *Pachyderms* with three toes to the hind-foot the articular surface of the tibia is oblique, and is divided into two facets between the perpendicular malleolar boundaries. Now in the *Macrauchenia*, although the two bones of the leg are anchylosed together, the extent of that part of the tarsal articular surface which is due to the tibia is indicated, as in the case of the radius in the joint of the fore-arm, by a groove; and we are thus able to compare this surface with the distal articular surface of the tibia in the *Palæothere* and *Anoplothere*. It presents in the *Macrauchenia* a very close resemblance with that of the *Palæotherium magnum*,\* being divided into two facets by a convex rising, which traverses the joint from behind forwards; but the ridge is narrower, the internal facet somewhat deeper, and the external oblique surface rather flatter than in the three-toed *Palæothere*. In the portion of the tarsal articular surface due to the fibula, we find, however, a more marked deviation from the *Palæothere*, and an interesting correspondence with the *Anoplothere*, in the inferior truncation and horizontal articular surface which is continued upon the lower extremity of the fibula, at right angles with the vertical malleolar facet which forms the outer boundary of the trochlea of the astragalus: this articular surface unerringly indicates a corresponding articular projection in the calcaneum, which, therefore, although the bone itself does not form part of the present collection, we may conclude to differ from the calcaneum of the *Palæotherium*, and to resemble that of the *Anoplotherium*, in this particular at least.

The valuable indication which the distal articular surfaces of the anchylosed tibia and fibula have given of the correspondence of the hind-foot with the fore-foot of the *Macrauchenia*, in regard to the number of the toes, receives ample confirmation from the astragalus, which, of all the bones in the foot, is the one that an anatomist would have chosen, had his choice been so limited, and which most fortunately has been secured by Mr. Darwin, in a very perfect state, in the present instance. I have compared this astragalus with that of the Giraffe, and other *Ruminants*, the Camel, the *Anoplothere*, the Horse, the Hog, the Hippopotamus, Rhinoceros, Tapir, and *Palæothere*: it is with the *Pachyderms* having three toes to the hind-foot, that the *Macrauchenia* agrees in the main distinguishing

\* See Ossem. Foss. iii. Pl. XXVI. fig. 5.



characters of this bone; its anterior articular surface, for example, is simple, and not divided into a double trochlea by a vertical ridge: lastly, it is with the astragalus of the Tapir and Palæothere that it presents the closest correspondence in the general form and the minor details of structure, and with these Pachyderms, therefore, I shall chiefly limit the comparison of the Macrauchenia, in regard to the bone in question. If the upper or tibial articular surface (fig. 5, Pl. XIV.) be compared with that in the *Palæotherium magnum* (Ossem. Foss. Pl. LIV. fig. 2,) it will be seen, that the general direction of that surface is more parallel with the axis of the bone in Macrauchenia. In the Palæotherium it is turned a little towards the outer or fibular side, and in the Tapir the general direction of the same surface is placed still more obliquely. The anterior border of this articulating surface is broken by a semicircular notch in the Palæothere; in the Tapir it describes a gentle concave curve, and the Macrauchene resembles the Tapir in this respect. The chief difference between the astragalus of the Tapir and the Palæothere, when viewed from above, obtains in the relative length of the bone, anterior to the tibial articulating surface: the Macrauchene presents, in this respect, an intermediate structure, but differs from both in the greater extent of the tibial side of this part of the astragalus.

If we next direct attention to the anterior or scaphoid articular surface, (fig. 3, Pl. XIV.) and compare it with that of the *Palæotherium magnum*, (fig. 4, Pl. liv, Ossem. Foss.) it will be seen, that it presents in the Macrauchenia an oval, and in the Palæotherium an irregular quadrangular form: in the Macrauchenia, this surface is uniform or undivided, and is gently convex, except at its lower part; while in the Palæothere it is divided by an oblique ridge into a broad internal facet for the scaphoid bone, and a narrow internal surface for articulation with the os cuboides; the larger surface is also concave transversely, and slightly convex vertically: in the Tapir, the anterior surface of the astragalus deviates still further from that of the Macrauchenia, both in general form, and in the proportion of the cuboidal facet. In the didactyle Anoplotherium, Camel, and true Ruminants, where the cuboides presents a large relative size, a still greater proportion of the anterior surface of the astragalus is devoted to the articulation with this bone, and is separated from the scaphoid surface by a well-developed vertical ridge. The Macrauchenia presents, therefore, the extreme variation from this type;—and should the entire tarsus hereafter be discovered, it will doubtless be found, that the os cuboides is articulated posteriorly to the os calcis exclusively.

The external surface of the astragalus of the Macrauchene, (fig. 1. Pl. XIV.) is longer in proportion to its vertical extent than in the Tapir or Palæothere: the articular surface for the fibular malleolus is less curved. Between this surface and the anterior facet the bone is excavated by a deep notch, both in the Tapir and Palæothere; but in the Macrauchenia by a gentle concavity. Beneath the

malleolar articular smooth surface in the Palæothere there is a deep pit; in the Tapir a shallow one; but in the Macrauchenia we observe only a smooth and slightly convex triangular surface. If we compare the inner surface of the astragalus in these three animals, we shall find the existing Tapir again forming a transition between the two extinct genera. In the Palæothere, a round protuberance projects from the anterior part of this surface: in the Tapir, we observe a gentle rising of the bone in the same part, while in the Macrauchene (fig. 2) the surface of the bone is level at this part. The margin of the tibial malleolar articular surface, which is very slightly raised in the Macrauchene, is more developed in the Tapir, and still more so in the Palæothere, where it forms a ridge, overhanging the rough outer side of the bone. Near the lower part of this surface we observe a small but deep depression in the Palæothere; there is a shallower one in the corresponding part in the Tapir; and the depression is still wider and shallower in the Macrauchenia. In the Palæothere the astragalus articulates by three surfaces with the os calcis, posteriorly by a large concave surface, externally by a longitudinal sub-elliptic surface, and anteriorly by a thin transverse facet: in the Macrauchene (fig. 4) two only of these surfaces are present, viz. the concave and the longitudinal one, the anterior transverse surface being wanting: in the Tapir, the transverse surface is present, but is confluent with the longitudinal one. The posterior surface is relatively larger and deeper in the Macrauchene than in the Palæothere, and approaches nearer to the triangular than the oval form: the longitudinal surface is placed more obliquely, and is truncated anteriorly. In the Tapir this surface is confluent with the scaphoid articular surface, but it is separated therefrom by a narrow strip of bone in both the Palæothere and Macrauchene. It is satisfactory to find in the bone, which marks most strongly the affinity of *Macrauchenia* to *Palæotherium*, so many easily recognizable differences, because the structure of the cervical vertebræ in the latter genus is too imperfectly known, to allow us to predicate confidently a distinction between it and *Macrauchenia* in that particular; the difference, however, which they present in the condition of the bones of the fore-arm and leg, forbids their being considered as generically related.

There remains to be noticed only a single fractured metatarsal bone (fig. 1. Pl. XV.) This, from its bent and unsymmetrical figure, is evidently not a middle one, and having the side of the proximal end, which was articulated to the adjoining metatarsal in a nearly perfect state, it enables us to refer it with certainty to the hind-foot, since it does not agree with any of the corresponding surfaces at the proximal extremities of the metacarpal bones. It remains then to be determined, whether it is an external metatarsal of the right-foot, or an internal one of the left-foot, the general curvature of these being in the same direction. With neither of these bones in the Tapir does our metatarsal agree, since it has but one articular facet on the lateral



surface of its proximal end, while the outer metatarsal of the right-foot of the Tapir, with which, in other respects, it most closely corresponds, has two articular surfaces. In the cast of a hind-foot of a Palæothere, I find that the outer metatarsal bone closely agrees with this metatarsal bone of the Macrauchene, in the structure just alluded to: the articulation with the middle metatarsal being by a single sub-oval facet, which stands out a little way from the surface of the bone: the articular surface in the Macrauchene presents a similar form and condition, and is similarly situated to that in the Palæothere, being at the posterior part of the lateral surface, and a little below the superior or tarsal articular surface. The bone expands towards its distal end, which corresponds in structure with those of the two lateral metatarsals in the fore-foot, in being completely divided into two trochlear surfaces by a well-developed median ridge, and in having the posterior half of this ridge suddenly produced, so as to project about two lines further from the trochlear surface than the anterior part of the same ridge. In both the Tapir and Palæothere this anterior part of the ridge is wholly suppressed, and the posterior is much more feebly developed than in the Macrauchenia. The metatarsal bone here described is of exactly the same length with the internal metacarpal bone, and proves, in conjunction with the proportions of the astralagus, that the fore and hind feet of the Macrauchenia were of equal size.

Thus then we obtain evidence, from a few mutilated bones of the trunk and extremities of a single representative of its race, that there once existed in South America a Pachydermatous quadruped, not proboscidian, which equalled in stature the Rhinoceroses and Hippopotamuses of the old world. But this, though an interesting and hitherto unsuspected fact, is far from being the sum of the information which is yielded by these fossils. We have seen that the single ungual phalanx bespeaks a quadruped of the great series of *Ungulata*, and this indication is corroborated by the condition of the radius and ulna, which are fixed immoveably in the prone position. Now in the Ungulated series there are but two known genera,—the Rhinoceros and Palæotherium,—which, like the quadruped in question, have only three toes on the fore-foot. Again, in referring the Macrauchenia to the Tridactyle family of Pachyderms, we find, towards the close of our analysis, and by a detailed comparison of individual bones, that the Macrauchenia has the closest affinity to the Palæotherium.

But the Palæotherium, like the Rhinoceros and Tapir, has the ulna distinct from the radius, and the fibula from the tibia; so that even if the Parisian Pachyderm had actually presented the same peculiarities of the cervical vertebræ as the Patagonian one, it would have been hazardous, to say the least, while ignorant of the dentition of the latter, to refer it to the genus *Palæotherium*.

Most interesting, indeed will be the knowledge, whenever the means of obtaining it may arrive, of the structure of the skull and teeth in the Macrauchenia.

Meanwhile, we cannot but recognise, in the anchylosed and confluent state of the bones of the fore-arm and leg, a marked tendency in it towards the Ruminant Order, and the singular modifications of the cervical vertebræ have enabled us to point out the precise family of that order, with which the Macrauchenia is more immediately allied.

In first demonstrating this relationship, it was shown in how many particulars the *Camelidæ*, without losing the essential characters of Ruminantia, manifested a tendency to the Pachydermatous type; and the evidence which the lost genera, *Macrauchenia* and *Anoplotherium*, bear to a reciprocal transition from the Pachyderms to the Ruminants, through the *Camelidæ*, cannot but be viewed with extreme interest by the Zoologist engaged in the study of the natural affinities of the Animal Kingdom.

The Macrauchenia is not less valuable to the Geologist, in reference to the geographical distribution of animal forms. It is well known how unlooked-for and unlikely was the announcement of the existence of an extinct quadruped entombed in the Paris Basin, whose closest affinities were to a genus, (*Tapirus*,) at that time, regarded as exclusively South American. Still greater surprise was excited when a species of the genus *Didelphys* was discovered to have co-existed in Europe with the *Palæotherium*.

Now, on the other hand, we find in South America, besides the Tapir, which is closely allied to the Palæothere, — and the Llama, to which the Anoplothere offers many traces of affinity, — the remains of an extinct Pachyderm, nearly akin to the European genus *Palæotherium*: and, lastly, this Macrauchenia is itself in a remarkable degree a transitional form, and manifests characters which connect it both with the Tapir and the Llama.

ADMEASUREMENTS OF THE BONES OF THE MACRAUCHENIA.

	Inches.	Lines.
Length of third (?) cervical vertebra . . . . .	7	9
Vertical diameter of ditto . . . . .	4	0
Do. do. of body of ditto . . . . .	2	3
Transverse diameter of ditto . . . . .	3	3
Vertical diameter of spinal canal . . . . .	1	...
Length of fourth lumbar vertebra . . . . .	5	5
Vertical diameter of body of ditto . . . . .	2	9
Transverse diameter of ditto . . . . .	2	10
Vertical diameter of spinal canal . . . . .	1	1
Transverse ditto ditto * . . . . .	1	6

\* This diameter increases rapidly in the posterior lumbar vertebræ, in correspondence with the enlargement of the spinal chord, which gives off the great nerves of the hinder extremities.



	Inches.	Lines.
Transverse diameter of last lumbar vertebra . . . . .	9	...
Ditto do. of body of ditto . . . . .	2	2
Vertical diameter of ditto . . . . .	1	3
Entire length of lumbar region of vertebral column . . . . .	20	...
Vertical diameter of glenoid cavity of scapula . . . . .	3	...
Transverse ditto ditto ditto . . . . .	2	10
Elevation of spine of scapula . . . . .	3	5
Vertical diameter of proximal articular surface of fore-arm . . . . .	3	6
Transverse ditto ditto ditto . . . . .	3	5
Height of olecranon . . . . .	5	3
Greatest diameter of its base . . . . .	2	...
Circumference of proximal end of anchylosed radius and ulna . . . . .	11	10
Entire length of inner toe of fore-foot, inclusive of metacarpal bone . . . . .	13	...
Breadth of proximal end of metacarpus . . . . .	3	8
Do. distal end of ditto . . . . .	5	4
Length of inner metacarpal bone . . . . .	7	6
Do. middle ditto . . . . .	8	...
Do. outer ditto . . . . .	7	...
Do. inner proximal phalanx . . . . .	3	6
Do. middle ditto . . . . .	2	10
Do. outer ditto . . . . .	3	4
Do. inner middle phalanx . . . . .	2	...
Do. middle ditto . . . . .	2	3
Do. inner distal phalanx * . . . . .	1	...
Do. the femur . . . . .	24	...
Diameter of base of articular surface of the head of ditto . . . . .	3	6
Greatest diameter of proximal end . . . . .	7	...
Do. of distal end . . . . .	6	3
Circumference of middle of shaft . . . . .	8	...
Length of tibia . . . . .	18	...
Greatest diameter of proximal end . . . . .	5	7
Do. of distal end, including fibula . . . . .	4	4
Circumference of middle of shaft . . . . .	9	...
Length of metatarsal bone † . . . . .	7	4

\* The relative breadth of these bones is shown in the figures of the fore-foot, Pl. XI.

† The figures in Pl. XIV. preclude the necessity of giving the admeasurements of the astragalus.

ERRATA.—The reader is requested to substitute the word '*right*' for '*left*' in the last line of p. 35, before the words '*radius*,' '*fore-foot*,' and '*femur*,' and in the first line of p. 36, before the words '*tibia*,' and '*hind-foot*.'

DESCRIPTION OF A FRAGMENT OF A CRANIUM OF AN EXTINCT MAMMAL,  
INDICATIVE OF A NEW GENUS OF EDENTATA, AND FOR WHICH IS PROPOSED  
THE NAME OF

### GLOSSOTHERIUM.

"La première chose à faire dans l'étude d'un animal fossile, est de reconnaître la forme de ses dents molaires; on détermine par-là s'il est carnivore ou herbivore;" says Cuvier, at the commencement of that series of splendid chapters in which the restoration of the extinct Pachyderms of the Paris Basin is recorded. In the present case, however, as in that of the Mammiferous animal whose fossil remains we were last considering, the important organs, to which Cuvier directs our first attention, are wanting. Nor are there here, as in the *Macrauchenia*, any remains of the locomotive extremities to compensate for the deficiency of teeth, and guide us into the right track of investigation and comparison. The animal, the nature and affinities of which are the subject of the following pages, is, in fact, represented in Mr. Darwin's collection, by nothing more than a fragment of the cranium.

This fragment, which was found in the bed of the same river, (see p. 16,) in Banda Oriental, with the cranium of the *Toxodon*, includes the parietes of the left side of the cerebral cavity, the corresponding nervous and vascular foramina, the left occipital condyle, a portion of the left zygomatic process, and, fortunately also, the left articular surface for the lower jaw. The importance of this surface in the determination of the affinities of a fossil animal has been duly appreciated, since the relations of the motions of the lower jaw to the kind of life of each animal were pointed out by Cuvier; but yet we should be deceived were we to establish, in conformity with the generalization enunciated by Cuvier,\* our conclusion, from this surface, of the nature of the food of the extinct species under con-

\* "Comme le genre de vie de chaque animal est toujours en rapport avec les mouvements dont sa mâchoire est susceptible, on retrouve dans la conformation des surfaces destinées à l'articulation, les particularités qui semblent le déterminer d'avance. Ainsi dans les animaux qui vivent de chairs, substances filamenteuses qui ne peuvent être écrasées, mais seulement coupées et déchirées, le mouvement de la mâchoire inférieure ne peut s'exécuter que de haut en bas. Dans les herbivores, les frugivores et les granivores, comme le principal mouvement est celui de broiement pour écraser, comprimer les herbes et les fruits, pour briser les grains et les réduire, en pâte, le mouvement des mâchoires se fait encore de droite à gauche, et réciproquement, on en même temps, de devant en arrière, en un mot, dans un plan horizontal autant que dans un vertical: les uns représentent des ciseaux, les autres des meules de moulin."



sideration; for the glenoid cavity is so shaped as to allow the lower jaw free motion in a horizontal plane, from right to left, and forwards or backwards, like the movements of a mill-stone; and, nevertheless, I venture to affirm it to be most probable, that the food of *Glossotherium* was derived from the animal and not from the vegetable kingdom; and to predict, that when the bones of the extremities shall be discovered, they will prove the Glossothere to be not an ungulate but an unguiculate quadruped, with a fore-foot endowed with the movements of pronation and supination, and armed with claws, adapted to make a breach in the strong walls of the habitations of those insect-societies, upon which there is good evidence in other parts of the present cranial fragment, that the animal, though as large as an ox, was adapted to prey.

We perceive, in the first place, looking upon the base of this portion of skull, a remarkable cavity, situated immediately behind the tympanic bone, of nearly a regular hemispherical form, an inch in diameter (fig. 2, *b*, Pl. XVI). The superficies of this cavity appears not to have been covered with articular cartilage, for it is irregularly pitted with many deep impressions; and I conclude, therefore, that it served to afford a ligamentous attachment to the styloid element of a large *os hyoides*. With this indication of the size of the skeleton of the tongue, is combined a more certain proof of the extent of its soft, and especially its muscular parts, in the magnitude of the foramen, for the passage of the lingual or motor nerve (*c*. fig. 2 and 3). This foramen, (the anterior condyloid,) in the present specimen, is the largest of those which perforate the walls of the cranium, with the exception of the foramen magnum; it is fully twice the size of that which gives passage to the second division of the fifth nerve; its area is oval, and eight lines in the long diameter, so that it readily admits the passage of the little finger.

It is only in the Ant-eaters and Pangolins that we find an approximation to these proportions of the foramen for the passage of the muscular nerve of the tongue; and the existing Myrmecophagous species even fall short of the larger fossil in this respect. Some idea of the size of the lingual nerve, and of the organ it was destined to put in motion, may be formed, when it is stated that the foramen giving passage to the corresponding nerve in the Giraffe,—the largest of the Ruminants, and having the longest and most muscular tongue in that order,—is scarcely more than one-fourth the size.

With these indications of the extraordinary development of the tongue, we are naturally led, in order to carry out a closer and more detailed comparison of the fossil in question, to that group of mammalia in which the tongue plays the chief part in the acquisition of the food. The size, form, and position of the occipital condyle,—the magnitude of the occipital foramen, (which must here have somewhat exceeded three inches in the transverse diameter,)—the slope of the occipital surface of the cranium from below, upwards and forwards, at an angle of 60°

with the base of the cranial cavity—each and all attest the close affinities of the present animal to the Edentata. More decisive evidence of the same relationship will be adduced from the organization of other parts of the cranium. The glenoid articular surface (*a*, fig. 2, Pl. XVI.) is an almost flattened plane, wider in the transverse than in the longitudinal direction; and, as in the genera *Myrmecophaga* and *Manis*, it is not defended behind by any descending process. In its general form it resembles the glenoid cavity of *Orycteropus* more than that of the preceding Edentates; but, in *Orycteropus*, the articulation is defended posteriorly by a descending process of the zygoma, and it is also situated relatively closer to the os tympanicum.

Had the *Glossotherium* teeth? The extent of the temporal muscle, which is indicated by the rugged surface of the temporal fossa, and by the well-marked boundary, formed by a slightly elevated bony ridge, which extends to near the line of the sagittal suture, together with the size of the zygomatic portion of the temporal bone, and the remains of the oblique suture by which it was articulated to the malar bone, enables me to answer this question confidently in the affirmative. They will probably be found to be molar teeth of a simple structure, as in the *Orycteropus*.

The evidence just alluded to of the existence of an os malæ is interesting, because this bone is wanting in the Pangolins; and its rudimental representative in the true Ant-eaters does not reach the zygomatic process of the temporal bone, which consequently has no articular or sutural surface at its anterior extremity. In the presence, therefore, of the surface for the junction of the os malæ, and the consequent evidence of the completion of the zygomatic arch, we learn that the Glossothere was more nearly allied to the Armadillos and *Orycterope*. That its affinity to the latter genus was closer than to the Armadillos we have most interesting evidence in the form and loose condition of the tympanic bone: it is represented of the natural size at fig. 4, Pl. XVI. Through the care and attention devoted to his specimens by their gifted discoverer, this bone was preserved *in situ*, as represented at *d*, fig. 1; but it had no osseous connection with the petrous or other elements of the temporal bone, and could be displaced and replaced with the same ease as in the *Orycterope*. This bony frame of the membrana tympani, in the Glossothere, describes rather more than a semicircle, having the horns directed upwards; it has a groove, one line in breadth, along its concave margin, for the attachment of the ear-drum, and sends down a rugged process, half an inch long, from its lower margin. In the *Dasypodes* and *Myrmecophagæ*, the tympanic bone soon becomes ankylosed with the other parts of the temporal; it is only in *Orycteropus*, among the existing insectivorous *Bruta* or *Edentata*, that it manifests throughout life the fetal condition of a distinct bony hoop, deficient at the upper part. The os tympanicum of *Orycteropus*, however, differs from that of



*Glossotherium*, in forming part of the circumference of an ellipse, whose long axis is vertical; and in sending outwards, from its anterior part, a convex eminence, which terminates in a point directed downwards and forwards.

Such appear to be the most characteristic features of the cranial fragment under consideration, in which we have found, that the articular surface for the os hyoides throws more light upon the nature of the animal of which it is a part, than even the glenoid cavity itself. There now remains to be described as much of the individual characters of the constituent bones as the specimen exhibits.

The occipital bone, besides forming the posterior and part of the inferior parietes of the cranium, extends for about half an inch upon the sides, where the ex-occipital element is articulated by a vertical suture with the mastoid element of the temporal: this suture is situated in a deep and well-marked muscular depression (*e*, fig. 1), measuring three inches in the vertical, and upwards of one inch in the transverse direction. The other sutures, uniting the occipital to the adjoining bones, are obliterated. The breadth of the occipital region must have exceeded the height of the same by about one-third. The condyle extends nearly to the external boundary of the occipital aspect of the cranium; there is situated, external to it, only a small ovate, rounded and smooth protuberance. The slightly concave surface of the occipital plane of the cranium is bounded above by a thick obtuse ridge, the muscular impressions are well sculptured upon it. It is traversed transversely at its upper third by a slightly elevated bony crest; and the surface below this ridge is again divided by a narrower intermuscular crest, which runs nearly vertically, at about an inch and a half from the external boundary of the occipital plane. As a similar crest must have existed on the opposite side, the general character of the occipital surface in the *Glossotherium* would resemble that of the *Toxodon*. A similar correspondence may be noticed in the terminal position of the condyle, and the slope of the occipital plane.

Above the transverse ridge, the rough surface of the occipital plane slopes forward, at a less obtuse angle with the basal plane, to the first named ridge which separates the occipital from the coronal or superior surface of the skull. The contour of this surface runs forwards, as far as the fragment extends, in an almost straight line: the extent of surface between the temporal muscular ridges must have been about five inches posteriorly, but it decreases gradually as it extends forwards: all that part which is preserved is quite smooth. The attachment of the fasciculi of the temporal muscle, and the convergence of their fibres as they passed through the zygoma are well marked on the sculptured surface of the bone. The zygomatic process is relatively stouter than in *Orycteropus*: it is prismatic: the external facet is nearly plane: the superior is concave, and increases in breadth anteriorly: the inferior surface offers a slight convexity behind the flattened articular surface for the lower jaw. The margin

of the zygoma formed by the meeting of the upper and lower facets presents a semicircular curve, extended transversely from the cranium, and directed forwards.

The anterior extremity is obliquely truncated from below upwards and forwards, and presents a flattened triangular surface indicative of its junction with an os malæ: the space between this extremity and the side of the cranium measures one inch and nine lines across, and thus gives us the thickness of the temporal muscle. The distance from the origin of the zygoma to the occipital plane is relatively greater than in *Orycteropus*; *Glossotherium* is in this respect more similar to *Myrmecophaga* and *Manis*.

The sphenoid bone forms a somewhat smooth protuberance below and behind the base of the zygoma. The tympanic bone is wedged in between this protuberance in front, and the mastoid process behind. The chief peculiarity of the broad mastoid is the regular semicircular cavity at its under part for the articulation of the styloid bone of the tongue. This depression is separated below by a broad rough protuberance from the foramen jugulare, (*f*, fig. 2, Pl. XVI,) which is immediately external to, and slightly in advance of the great foramen condyloideum, *c*. A small rugged portion of the os petrosus separates the jugular from the carotid canal, which arches upwards and directly inwards to the side of the shallow sella turcica, (the external and internal orifices of the carotid canal are shown at *g*, figs. 2 and 3). The chief protuberance on the basis cranii is a large and rugged one, serving for the attachment of muscles, and due chiefly to the expansion of a great sinus in the body of the sphenoid. This protuberance is separated from the smaller sphenoid protuberance before mentioned by a large groove continued downwards and forwards from the tympanic cavity, and containing the Eustachian tube, which does not traverse a complete osseous canal. Immediately internal to the glenoid cavity is the large orifice of the canal transmitting the third division of the fifth pair of nerves, the principal branch of which endows the tongue with sensibility; this foramen (*h*, fig. 2) is rather less than that for the muscular nerve of the tongue.

The internal surface of the present cranial fragment affords a very satisfactory idea of the size and shape of the brain of the extinct species to which it belongs. It is evident that, as in other Bruta, the cerebellum must have been almost entirely exposed behind the cerebrum; and that the latter was of small relative size, not exceeding that of the Ass; and chiefly remarkable, as in the *Orycteropus*, Ant-eater, and Armadillo for the great development of the olfactory ganglia. The antero-posterior extent of the cribriform plate, as exposed in this fragment, is three inches, and the complication of the ethmoid olfactory lamellæ which radiate from it into the nasal cavity is equal to that which exists in the smaller Edentata (fig. 3, Pl. XVI). The nasal cavity is complicated in *Gloss-*



*therium* by the great number and capacious size of the air-cells which are in communication with it: these extend over all the upper, lateral, and back parts of the cranial cavity, as far even as the upper boundary of the foramen magnum: they also occupy the anterior two-thirds of the basis cranii. The external configuration of the skull would, therefore, afford a very inadequate or rather deceptive notion of the capacity of the cerebral cavity, were not the existence and magnitude of these sinuses known. The interspace of the outer and inner tables of the cranium are separated above the origins of the olfactory ganglia for the extent of three inches: above the middle of the cerebrum they are an inch and a half apart; at the sides of the cranium the interposed air-cells are from one to two inches across; at the back part of the cranium about one inch. The sinuses have generally a rounded form.

The foramen rotundum, (through which in figure 3 a probe is represented as passing), and the foramen ovale are situated close together, within a common transversely oblong depression (*i*). The carotid canal (*g*) opens into the outer side of the commencement of this wide channel, which conducts the great fifth pair of nerves to the outlets of its two chief divisions.

The petrous bone projects into the cranial cavity, in the form of an angular process with three facets: the foramen auditorium internum (*k*), and the aqueductus vestibuli, are situated on the posterior facet. Immediately behind the os petrosum is the foramen lacerum jugulare (*l*), situated at the point of convergence of the vertical groove of the lateral sinus, with a groove of similar size continued forwards from above the anterior condyloid canal. The plane of the internal opening of this canal (*c*, fig. 3) is directed obliquely inwards and backwards, and the lateral wall of the foramen magnum behind the foramen condyloideum slopes outwards to the edge of the condyle. Immediately internal to the foramen condyloideum is a small vascular foramen conducting a branch of the basilar artery into the condyloid canal, for the nourishment, doubtless, of the great lingual nerve.

In the relations of the plane of the internal orifice of the anterior condyloid foramen with that of the foramen magnum, we search in vain for a corresponding structure in any of the Mammiferous orders, save the Edentata:\* and among these the Orycterope comes nearest the Glossothere in this respect. In the degree of development of the internal osseous ridge giving attachment to the tentorium cerebelli, the Ant-eaters and Armadillos more resemble the Glossothere than does the Orycterope; in which a continuous bony plate arches across the cranial cavity: in the Manis a still greater proportion of the tentorium is ossified,

\* In the monotrematous Echidna, the large canal for the lingual nerve has a widely different direction and course from that in the placental Edentata.

and it consequently recedes the furthest amongst the Edentata, in this, as in most other particulars of the cranial organization, from the Glossothere. The chief distinctive peculiarity in the cranium of the Glossothere, so far as it can be studied in the present fragment, and compared with that of other Edentata, is the deep, well-marked, semicircular styloid depression, above described.

A question may arise after perusing the preceding evidence, upon which the present fossil is referred to a great Edentate species nearly allied to the *Orycteropus*, whether one or other of the lower jaws, subsequently to be described, and in like manner referable, from their dentition, either to the *Orycteropodoid* or *Dasy-podoid* families of Edentata, may not have belonged to the same species as does the present mutilated cranium. I can only answer, that those jaws were discovered by Mr. Darwin in a different and very remote locality,—that no fragments or teeth referable to them were found associated with the present fossil; and that, as it would be, therefore, impossible to determine from the evidence we have now before us, which of the two lower jaws should be associated with *Glossotherium*; and as both may with equal if not greater probability belong to a totally distinct genus, it appears to me to be preferable, both in regard to the advancement of our knowledge of these most interesting Edentata of an ancient world, as well as for the convenience of their description, to assign to them, for the present, distinct generic appellations.

The figures in Plate XVI. preclude the necessity of a table of admeasurements of the cranial fragment of *Glossotherium*.

DESCRIPTION OF A MUTILATED LOWER JAW AND TEETH, ON WHICH IS FOUNDED  
A SUBGENUS OF MEGATHERIOID EDENTATA, UNDER THE NAME OF

MYLODON.

THE genus *Megalonyx*, as is well known, owes its name and the discovery of the fossil remains on which it was founded, to the celebrated Jefferson,\* formerly President of the United States. Cuvier, from an examination of a single tooth, and the casts of certain bones of the extremities, especially the terminal ones, determined the ordinal affinities of this remarkable extinct quadruped.† But while he

\* Transactions of the Philosophical Society of Philadelphia, vol. iv. p. 246.

† Its relations to the Edentata, previously conjectured by Dr. Wistar, are proved in the Annales du Muséum, tom. v. p. 358; its more immediate affinities as an annectant form in that group are discussed in the edition of the Ossem. Fossiles, of 1833, tom. v. pt. 1. p. 160.



retained the name of *Megalonyx*, and used it in a generic sense, Cuvier offered no characters whereby other fossil remains might be generically either distinguished from, or identified with the *Megalonyx Jeffersonii*, unless, among such remains there happened to be a tooth, or a claw exactly corresponding with the descriptions and figures in the *Ossements Fossiles*; and when, of course, a specific identity, and not merely a generic relationship would be established.

The greater part of Cuvier's chapter on *Megalonyx* is devoted to the beautiful and justly celebrated reasoning on the ungual phalanx, whereby it is proved to belong, not to a gigantic Carnivore of the Lion-kind, as Jefferson supposed, but to the less formidable order of Edentate quadrupeds; and Cuvier, in reference to the tooth,—the part on which alone a generic character could have been founded,—merely observes that it resembles at least as much the teeth of one of the great Armadillos, as it does those of the Sloths.\*

In the last edition of the *Régne Animal*, Cuvier introduces the *Megatherium* and *Megalonyx*, between the Sloths and Armadillos; but alludes to no other difference between the two genera than that of size,—“l'autre, le *Megalonyx*, est un peu moindre.” (p. 226.) Some systematic naturalists, as Desmarest, and Fischer, have, therefore, suppressed the genus, and made the *Megalonyx* a species of *Megatherium* under the name of *Megatherium Jeffersonii*. The dental characters of the genus *Megatherium* are laid down by Fischer† as follows:—“*Dent. prim. et lan.*  $\frac{9}{10}$ . *molares*  $\frac{4}{5}$ — $\frac{3}{4}$ , *obducti, tritores, coronide nunc planâ transversim sulcatâ nunc medio excavatâ marginibus prominulis.*” That *Megalonyx* had the same number of molares as *Megatherium*, (supposing that number in the Megathere to be correctly stated, which it is not,) is here assumed from analogy, for neither Jefferson, Wistar, nor Cuvier,—the authorities for *Megalonyx* quoted by Fischer—possessed other means of knowing the dentition of that animal than were afforded by the fragment of a single tooth.

Now the almost entire lower jaw about to be described offers, in so far as respects the general form and structure of the teeth, the same kind and degree of correspondence with the *Megatherium*, as does the *Megalonyx Jeffersonii* of Cuvier: and, what is only probable in that species, is here certain, viz., an agreement with the *Megatherium* in the class, viz. *molares*, to which the teeth exclusively belong. The question, therefore, on which I find myself, in the outset, called upon to come to a decision is, as to the preference of the mode of viewing the subject of the generic relationship of the *Megalonyx* adopted by Desmarest, Fischer, &c., or of that, on which Cuvier, and after him Dr. Harlan, have practically acted: whether, in short, the genus *Megatherium* is to rest upon the more

\* Speaking of this tooth, Cuvier observes, “Je l'avois cru d'abord nécessairement de paresseux; mais aujourd'hui que je connois mieux l'ostéologie des divers tatous, je trouve qu'elle ressemble au moins autant à une dent de l'un des grands tatous.—Loc. cit. p. 172.

† Synopsis Mammalium.

comprehensive characters of kind and general structure of the teeth, or upon the more restricted ones, of form and such modifications in the disposition and proportions of the component textures of the tooth, as give rise to the characteristic appearances of the triturating surface of the crown.

With respect to existing Mammalia, most naturalists of the present day seem to be unanimous as to the convenience at least of founding a generic or sub-generic distinction on well marked modifications in the form and structure of the teeth, although they may correspond in number and kind, in proof of which it needs only to peruse the pages of a *Systema Mammalium* which relate to the distribution of the Rodent Order. According to this mode of viewing the logical abstractions under which species are grouped together, the extinct Edentate Mammal discovered by Jefferson must be referred to a genus distinct from *Megatherium*, and for which the term *Megalonyx* should be retained. This will be sufficiently evident by comparing the descriptions given by Cuvier of one of the teeth of the *Megalonyx Jeffersonii*, and by Dr. Harlan of a tooth of his *Megalonyx laqueatus*, with those of the *Megatherium* which have been published by Mr. Clift. The fragment of the molar tooth of the *Megalonyx Jeffersonii*, described and figured in the *Ossements Fossiles*, seems to have been implanted in the jaw, like the teeth of the *Megatherium*, by a simple hollow base similar in form and size to the protruded crown: its structure Cuvier describes as consisting of a central cylinder of bone enveloped in a sheath of enamel.\* The transverse section of this tooth presents an irregular elliptical form, the external contour being gently and uniformly convex, the internal one, undulating; convex in the middle, and slightly concave on each side, arising from the tooth being traversed longitudinally on its inner side by two wide and shallow depressions.

The imperfect tooth of the species called by Dr. Harlan *Megalonyx laqueatus*, and of which a cast was presented by that able and industrious naturalist to the Museum of the Royal College of Surgeons, resembles in general form, and especially in the characteristic double longitudinal groove on the inner side, the tooth of the *Megalonyx Jeffersonii*. It is thus described by Dr. Harlan:

“The fractured molar tooth appears to have belonged to the inferior maxilla on the right side; the crown is destroyed; a part of the cavity of the root remains. The body is compressed transversely, and presents a double curvature, which renders its anterior and exterior aspects slightly convex; the posterior and interior gently concave; these surfaces are all uniform, with the exception of the interior or mesial aspect, which presents a longitudinal rib or ridge, one-half the thickness of the long diameter of the tooth; with a broad, not profound longitudinal

\* It is most probable that the substance which is here termed “enamel,” is similar to that which forms the dense prominent ridges in the tooth of the *Megatherium*, and which I have shown to be composed of minute parallel calcigerous tubes, similar to the ivory or bone of the human tooth.



groove or channel along each of its borders. It is from this resemblance to a portion of a fluted column, that the animal takes its specific appellation (*Meg<sup>x</sup>. laqueatus*).

"The crown would resemble an irregular ellipsis widest at the anterior portion. The tooth consists of a central pillar of bone surrounded with enamel, the former of a dead white, the latter of a ferruginous brown colour: the transverse diameter is more than two-thirds less than its length, whilst that of *Meg<sup>x</sup>. Jeffersonii* is only one-third less—the antero-posterior diameter is one-half its length in the former, and two-thirds less in the latter. The proportions of this tooth are consequently totally at variance with that of its kindred species." [Vide Pl. XII. fig. 7, 8, 9.]\*

Dr. Harlan describes also two claws of the fore-foot, a radius, humerus, scapula, one rib, an os calcis, a metacarpal bone, certain vertebræ, a femur, and tibia, of the same *Megalonyx*; these parts of the skeleton, together with the tooth, which so fortunately served to establish the generic relationship of the species with the *Megalonyx* of Jefferson and Cuvier, were discovered in Big-bone-cave, Tennessee, United States.

Dr. Harlan does not enter into the question of the generic characters of *Megalonyx*, but it would seem that he felt them to rest not entirely on dental modifications, for he observes that "a minute examination of the tooth and knee-joint renders it not improbable, supposing the last named character to be peculiar to it, that if the whole frame should hereafter be discovered, it may even claim a generic distinction, in which case, either *Aulaxodon*, or *Pleurodon*, would not be an inappropriate name."†

There can be no doubt, as it appears to me, with respect to a fossil jaw presenting teeth in the same number, and of the same general structure, as in the *Megatherium*, and with individual modifications of form, as well marked as those which distinguish *Megatherium* from *Megalonyx*, that the Palæontologist has no other choice than to refer it, either as Fischer has done with *Megalonyx*, to a distinct species of the genus *Megatherium*, or to regard it as the type of a subgenus distinct from both. With reference, however, to the *Pleurodon* of Dr. Harlan, after a detailed comparison of the cast of the tooth on which that genus is mainly founded, with the descriptions and figures of the tooth of the *Megalonyx Jeffersonii*, in the "Ossemens Fossiles," they seem to differ in so slight a degree as to warrant only a specific distinction, and this difference even, viewing the various proportions of the teeth in the same jaw of the *Megatherium*, is more satisfactorily established by the characters pointed out by Dr. Harlan in the form and proportions of the radius, than by those in the tooth itself.

\* Medical and Physical Researches, pp. 323—4.

† Loc cit. p. 330.

The next notice of the *Megalonyx* which I have consulted, in the hope of meeting with additional and more precise information as to its real generic characters, is an account given by the learned Professor Doellinger,\* of some fossil bones, collected by the accomplished travellers Spix and Martius in the cave of Lassa Grande, near the Arrayal de Torracigos, in Brazil. In this collection, however, it unfortunately happens that there are no teeth, but only a few bones of the extremities, including some ungual phalanges, which Professor Doellinger concludes, from their shape, the presence of an osseous sheath for the claw, and the form of their articulation, to belong, without doubt, to an animal of the Megatherioid kind, about the size of an Ox. He particularly states that they are not bones of an immature individual; but that they agree sufficiently with Cuvier's descriptions and figures of the *Megalonyx* to be referred to that species of animal (zu dieses thierart;) and he adds, what is certainly an interesting fact, that the fossils in question form the first of the kind that had been discovered out of North America.

Subsequently to the discovery of these bones, and of those of the *Megalonyx laqueatus* above alluded to, the remains of another great Edentate animal were found in North America, and were deposited in the Lyceum at New York; among these is a portion of the lower jaw with the whole dental series of one side. It is thus described by Dr. Harlan.

"The fragment I am now about to describe is a portion of the dexter lower jaw of the *Megalonyx*, containing four molar teeth; three of the crowns of these teeth are perfect, that of the anterior one is imperfect. These teeth differ considerably from each other in shape, and increase in size from the front, the fourth and posterior tooth being double the size of the first, and more compressed laterally; it is also vertically concave on its external aspect, and vertically convex on its internal aspect; the interior or mesial surface is strongly fluted, and it has a deep longitudinal furrow on the dermal aspect, in which respect it differs from the tooth of the *M. laqueatus* previously described by me, of which the dermal aspect is uniform, but to which, in all other respects, it has a close resemblance. I suppose it therefore probable, that this last may have belonged to the upper jaw. The three anterior molars differ in shape and markings: they are vertically grooved, or fluted, on their interior and posterior aspects, a transverse section presenting an irregular cube. The length of the crown of the posterior molar is two inches: the breadth about five-tenths of an inch: the length of the tooth is three inches and six-tenths. The diameter of the penultimate molar is eight-tenths by seven-tenths of an inch. The length of this fragment of the jaw-bone is eight inches and four-tenths; the height three inches and six-tenths: the length of the space occupied by the alveolar sockets five inches and eight-

\* Spix and Martius, Reise in Brazil, Band ii. p. 5.



tenths. The crown of the tooth presents no protuberances, but resembles that of the Sloth; the roots are hollow.\*

This fossil is referred by Dr. Harlan to his *Megalonyx laqueatus*; but, pending the absence of other proof of the identity of species, in which, as may be seen by comparing fig. 2, with fig. 4, in Pl. XVII., the teeth differ widely in form, it would be obviously hazardous to adopt such an approximation on hypothetical grounds.† In order, however, to obtain more satisfactory evidence of the nature and amount of the difference between the *Megalonyx laqueatus*, and the allied animal represented by the above-described fragment of lower jaw, I wrote to my much respected friend M. LAURILLARD, requesting him to send me a sketch of the teeth in the cast of that lower jaw, which had been transmitted from New York to the Garden of Plants. With full confidence in the characteristic precision and accuracy of the drawing with which I have been obligingly favoured by M. Laurillard, I am disposed to regard the amount of difference recognizable in every tooth in the lower jaw in question (fig. 3 and 4,) as compared with the molar tooth either of *Megalonyx Jeffersonii* (fig. 1,) or *Meg<sup>x</sup>. laqueatus* (fig. 2) to be such as to justify its generic separation from *Megalonyx* on the same grounds as *Megalonyx* is distinguished from *Megatherium*, and for the subgenus of Megatherioid Edentata, thus indicated, I would propose the name of MYLONDON.‡ The species of which the fossil remains are described by Dr. Harlan may be dedicated to that indefatigable Naturalist who has contributed to natural science so much valuable information respecting the Zoology, both recent and fossil, of the North American continent. The fossil about to be described represents a second and smaller species of the same genus, and I propose to call it *Mylodon Darwinii*, in honour of its discoverer, of whose researches in the Southern division of the New World it forms one of many new and interesting fruits.

\* Harlan's Medical and Physical Researches, 1835, p. 334. M. de Blainville speaks of a cast of a fragment of a lower jaw "portant encore cinq dents en série;" as having been transmitted to the Museum of the Garden of Plants from North America, together with other bones, all of which he refers to the genus *Megalonyx*; M. de Blainville does not describe these teeth, which is to be regretted, inasmuch as, if he be correct in regard to their number, which can hardly be doubted, and if he wrote with any clear and definite ideas of the generic characters of *Megalonyx*, this would indicate that *Megalonyx* differed generically both from *Megatherium* and *Mylodon* in a more important dental character than has hitherto been suspected (See "Comptes Rendus, &c." 1839, No. V. p. 142.)

† Dr. Harlan also indicates differences in certain parts of the skeleton of the New York fossils as compared with his *Meg<sup>x</sup>. laqueatus*; but thinks them probably due to a difference in the age of the individuals: he says "There is also in Mr. Graves' collection, in New York, a tibia, nearly perfect from the right leg; the segment of a flattened sphere, on which the external condyle of the femur moves, is rather more depressed, than in the specimen from Big-bone-cave. Other marks and peculiarities are observable on this bone, not found on that of the *Megalonyx laqueatus* of Big-bone-cave, but they are probably due to a difference in the age of the individuals." Loc. cit. p. 335.

‡ *Μύλον, mola*; *ὀδόν, dens*.

This fossil was discovered in a bed of partly consolidated gravel at the base of the cliff called Punta Alta, at Bahia Blanca in Northern Patagonia: it consists of the lower jaw with the series of teeth entire on both sides: but the extremity of the symphysis, the coronoid and condyloid processes, and the angular process of the left ramus, are wanting. The teeth are composed, as in *Bradypus*, *Megatherium* and *Megalonyx*, of a central pillar of coarse ivory, immediately invested with a thin layer of fine and dense ivory, and the whole surrounded by a thick coating of cement.

In the fig. 5, Pl. XVII., the fine ivory is represented by the white striated concentric tract on the grinding surface of the teeth; it is of a yellowish-white colour in the fossil, and stands out, as an obtuse ridge, from that surface: both these conditions depend on the large proportion of the mineral to the animal constituent in this substance of the tooth. The external layer of the cement presents in the fossil the same yellowish-brown tint as the bone itself, which it so closely resembles, both in intimate structure and in chemical composition; the internal layer next the dense ivory is jet black, indicating the great proportion of animal matter originally present in this part. The central pillar of coarse ivory, which, from its more yielding texture, has been worn down into a hollow at the triturating surface of the tooth, also presents, as a consequence of the less proportion of the hardening phosphates, a darker brown colour than the external layer of the cement, or the bone itself.

The teeth are implanted in very deep sockets; about one-sixth only of the last molar projects above the alveolus; the proportion of the exposed part of the tooth increases as they are placed further forwards. The implanted part of each tooth is simple; preserving the same size and form as the projecting crown, and presenting a large conical cavity at the base, indicative of the original persistent pulp, and perpetual growth of these teeth.

The extent of the whole four alveoli is four inches, eight lines; the length of the jaw from the angle to the broken end of the symphysis is seventeen inches and a half;\* from the figures it will be seen that only a small proportion of the anterior part of the jaw is lost, so that we may regard the dentigerous part of the jaw as being limited to about one-fourth of its entire length; the alveoli being nearly equidistant from the two extremities. The first and second teeth, counting backwards, are separated by an interspace of rather more than three lines; that between the second and third is one line less; the third and fourth are rather more than a line apart: from the oblique position, however, of the three hinder teeth the intervals between them appear in a side view, as in fig. 1, Pl. XIX., to be less than in reality, and the third and fourth teeth seem to touch each other.

\* If the lower jaw of *Mylodon Harlani*, bears the same proportion to its teeth as does that of *Mylodon Darwinii*, it must be about two feet in length.



Each tooth has a form and size peculiar to itself, and different from the rest, but corresponds of course with its fellow on the opposite side. The same may be observed, but in a less degree, in the teeth of the *Megatherium* itself; hence, it is obviously hazardous to found a generic distinction upon a single tooth, unless, as in the case of the *Glyptodon*,\* the modification of form happens to be extremely well marked. The whole series of teeth, or their sockets, at least of one of the jaws, should be known for the purpose of making a satisfactory comparison with the previously established Edentate genera.

The first molar in the present jaw is the smallest and simplest of the series: its transverse section is ellipsoid, or subovate, narrowest in front, and somewhat more convex on the outer than on the inner side: the long diameter of the ellipse is nine lines, the short or transverse diameter six lines: the length of the tooth may be about three inches, but I have not deemed it necessary to fracture the alveolus in order to ascertain precisely this point.

The second tooth presents in transverse section a more irregular and wider oval figure than the first: the line of the outer side is convex, but that of the inner side slightly concave, in consequence of the tooth being traversed longitudinally by a broad and shallow channel or impression; the longitudinal diameter of the transverse section is one inch; the transverse diameter at the widest part nine lines. There is a slight difference in the size of this tooth on the two sides of the jaw, the right one, from which the above dimensions are taken, being the largest.

The transverse section of the third tooth has a trapezoidal or rhomboidal form; the angles are rounded off; the posterior one is most produced; the anterior and posterior surfaces are flattened, the latter slightly concave in the middle; the external and internal sides are concave in the middle, especially the inner side, where the concavity approaches to the form of an entering notch. The longest diameter of the transverse section of this tooth is thirteen lines, the shortest seven lines and a half: in the tooth on the right side the external surface is nearly flat; this slight difference is not indicated in the figure (Pl. XVIII.)

The last molar, which is generally the most characteristic in the fossil *Bruta*, presents in an exaggerated degree the peculiarities of the preceding tooth; the longitudinal channels on both the outer and inner surfaces encroach so far upon the substance of the tooth, that the central coarse ivory substance is as it were squeezed out of the interspace, and the elevated ridge of the dense ivory describes an hour-glass figure upon the triturating surface, the connecting isthmus being but half the breadth of the rest of the tract; the external cæmentum preserves nearly an equal thickness throughout. Of the two lobes into which this tooth is

\* See Proceedings of the Geological Society, March 1839, and Parish's Buenos Ayres, p. 178, *b*, Pl. 1, fig. 2 and 3.

divided by the transverse constriction, the anterior is the largest; their proportions and oblique position are pretty accurately given in the figure. The longitudinal diameter of the transverse section of this tooth is one inch, seven lines, its greatest lateral or transverse diameter is ten lines, its least diameter at the constricted part is three lines, the length of the entire tooth is four inches. Judging from the form of the jaw, the length of the other teeth decreases in a regular ratio to the anterior one. The posterior tooth is slightly curved, as shown in fig. 2, Pl. XIX., with the concavity directed towards the outer side of the jaw.

The general form of the horizontal ramus of the jaw, is so well illustrated in the figures Pl. XVIII. and XIX., that the description may be brief.

The symphysis is completely anchylosed, about four inches in length, and extended forward to the extremity of the jaw at a very slight angle with the inferior border of the ramus: it is of great breadth, smooth and gently concave internally, and suggests the idea of its adaptation for the support and gliding movements forwards and backwards of the free extremity of a long and well-developed tongue.

The exterior surface of the symphysis is characterized by the presence of two oval mamilloid processes, situated on each side of the middle-line, and about half way between the anterior and posterior extremes of the symphysis. A front view of these processes, of the natural size, is given in fig. 4, Pl. XIX.: a side view of the one on the right side represented in the reduced figure.

Nearly four inches behind the anterior extremity of the above process is the large anterior opening of the dental canal: it is five lines in diameter, situated about one-third of the depth of the ramus of the jaw from the upper margin. The magnitude of this foramen, which gives passage to the nerve and artery of the lower lip, indicates that this part was of large size; and the two symphyseal processes, which probably were subservient to the attachment of large retractor muscles, denote the free and extensive motions of such a lip, as we have presumed to have existed from the size of the foramina destined for the transmission of its nervous and nutrient organs.

The angle of the jaw is produced backwards, and ends in an obtuse point, slightly bent upwards; a foramen, one-third less than the anterior one, leads from near the commencement of the dental canal, to the outer surface of the jaw, a little below and behind the last molar tooth; this foramen presents the same size and relative position on both sides of the jaw. I find no indication of a corresponding foramen, or of symphyseal processes in the figures or descriptions of the lower jaw of the *Megatherium*, nor in the lower jaw of the Sloths, Ant-eaters, Armadillos, or Manises, which I have had the opportunity of examining with a view to this comparison.



In the *Megatherium* the inferior contour of the lower jaw is peculiarly remarkable, as Cuvier has observed, for the convex prominence or enlargement which is developed downwards from its middle part. In the *Mylodon* the corresponding convexity exists in a very slight degree, not exceeding that which may be observed at the corresponding part of the lower jaw of the *Ai*, or *Orycterope*. A broad and shallow furrow extends along the outer side of the jaw, close to the alveolar margin, from the beginning of the coronoid process to the anterior dental foramen.

The base of the coronoid process begins external and posterior to the last grinder: the whole of the ascending ramus of the jaw, beneath the coronoid process is excavated on its inner side by a wide and deep concavity, bounded below by a well-marked ridge, which extends obliquely backwards from the posterior part of the alveolus of the last grinder to the inferior margin of the ascending ramus, which is bent inwards before it reaches the angle of the jaw.

The large foramen or entry to the dental canal is situated in the internal concavity of the ascending ramus of the jaw, two inches behind the last molar, three inches from the lower margin of the ramus, and nearly five inches from the elevated angle of the jaw: it measures nine lines in the vertical diameter, and its magnitude indicates the large size of the vessels which are destined to supply the materials for the constant renewal of the dental substance, — a substance which from its texture must be supposed to have been subject to rapid abrasion. About an inch behind the dental foramen a deep vascular groove, about two lines in breadth, is continued downwards to the ridge which circumscribes the internal concavity of this part of the jaw, and perforates the ridge, which thus arches over the canal: this structure is present in both rami of the jaw. The mylo-hyoid ridge is distinctly marked about an inch and a half below the alveolar margin. Other muscular ridges and irregular eminences are present on the outer side of the base of the ascending ramus, and near the angle of the jaw; as shown in fig. 1, Pl. XIX.

From the preceding descriptions it will be seen that the lower jaw of the *Mylodon* is very different from that of the *Megatherium*; with that of the *Megalonyx* we have at present no means of comparing it. Among existing Edentata the *Mylodon*, in the form of the posterior part and angle of the jaw, holds an intermediate place between the *Ai* and the great Armadillo; in the form of the ankylosed symphysis of the lower jaw it resembles most closely the Unau or two-toed Sloth; but in the peculiar external configuration of the symphysis resulting from the mammilloid processes above described, the *Mylodon* presents a character which has not hitherto been observed in any other species of *Bruta*, either recent or fossil.

In conclusion it may be stated, that the teeth and bones here described offer

all the conditions and appearances of those of a full grown animal; and that they present a marked difference of size as compared with those of the *Mylodon Harlani*, as will be evident by the following admeasurements.

## ADMEASUREMENTS OF THE LOWER JAW OF MYLODON DARWINII.

	Inches.	Lines.
Length (as far as complete) . . . . .	17	6
Extreme width, from the outside of one ramus to that of the other . . . . .	9	0
Depth of each ramus . . . . .	4	9
Length of alveolar series . . . . .	4	8
From first molar to broken end of symphysis . . . . .	6	0
Breadth of symphysis . . . . .	3	7
Longitudinal extent of symphysis . . . . .	4	6
Circumference of narrowest part of each ramus . . . . .	5	9

DESCRIPTION OF A CONSIDERABLE PART OF THE SKELETON OF A LARGE EDENTATE MAMMAL, ALLIED TO THE MEGATHERIUM AND ORYCTEROPUS, AND FOR WHICH IS PROPOSED THE NAME OF

SCOLIDOTHERIUM\* LEPTOCEPHALUM.

OF the large Edentate quadrupeds that once existed in the New World, sufficient of the osseous remains of the gigantic *Megatherium* alone has been transmitted to Europe to give a satisfactory idea of the general form and proportions of the extinct animal.

Different bones of the *Megalonyx*, *Mylodon*, and *Glyptodon* have been described, but not sufficient of the remains of any individual of these subgenera has, hitherto, reached Europe, or been so described as to enable us to form a comparison between them and the *Megatherium*, or any of the existing Edentata, in regard to the general construction and proportions of the entire skeleton.

This state of our knowledge of the osteology of the singular giants of the Edentate Order renders the remains of the present animal peculiarly interesting, since, although the extremities are too imperfect to enable us to reconstruct the entire skeleton, a sufficient proportion of it has been preserved in the natural position to give a very satisfactory idea of its affinities to other Edentata, whose osteology is more completely known.

\* Σκελῆς, femur; ὀστρον, bellua; in allusion to the disproportionate size of the thigh-bone.



The fossil remains here described were discovered by Mr. Darwin in the same bed of partly consolidated gravel at Punta Alta, Northern Patagonia, as that in which the lower jaws of the *Toxodon* and *Myiodon* were imbedded. The parts of the skeleton about to be described were discovered in their natural relative position, as represented at Pl. XX., indicating, Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been subject to little disturbance.\* They include the cranium, nearly entire, with the teeth and part of the os hyoides; the seven cervical, eight of the dorsal, and five of the sacral vertebræ, the two scapulæ, left humerus, radius and ulna, two carpal bones, and an ungueal phalanx; both femora, the proximal extremities of the left tibia and fibula, and the left astragalus.

The principal parts of the cranium which are deficient are the anterior extremities of both the upper and lower jaws, the os frontis, æthmoid bone, and the whole upper part of the facial division of the skull; but sufficient remains to show that the general form of the skull resembled an elongated, slender, sub-compressed cone, commencing behind by a flattened vertical base, slightly expanding to the zygomatic region, and thence gradually contracting in all its dimensions to the anterior extremity.

The Cape Ant-eater (*Orycteropus*), of all Edentata, most nearly resembles the present fossil in the form of its cranium, and next in this comparison the great Armadillo (*Dasypus gigas*, Cuv.) may be cited: on the supposition, therefore, that the correspondence with the above existing Edentals observable in the parts of the fossil cranium which do exist, was carried out through those which are defective, the length of the skull of the Scelidotherium must have been not less than two feet. If now the reader will turn to Pl. XX. he will see that this cranium is singularly small and slender in proportion to the rest of the skeleton, especially the bulky pelvis and femur, of which bones the latter has a length of seventeen inches, and a breadth of not less than nine inches; the astragalus, again, exceeds in bulk that of the largest Hippopotamus or Rhinoceros; yet the condition of the epiphyseal extremities of the long bones proves the present fossils to have belonged to an immature animal. Hence, although the Scelidotherium, like most other Edentals, was of low stature, and, like the Megatherium, presented a disproportionate development of the hinder parts, it is probable, that, bulk for bulk, it equalled, when alive, the largest existing pachyderms, not proboscidian. There is no evidence that it possessed a tessellated osseous coat of mail.

I shall commence the description of the present skeleton with the cranium.

\* This beach is covered at spring tides; many parts of the skeleton were encrusted with recent *Flustra*, and small marine shells were lodged in the crevices between the bones.

The condyles of the occiput (See Pl. XXI. fig. 2,) are wide apart, sub-elliptic, very similar in position, form, and relative size to those in *Orycteropus*. The foramen occipitale is transversely oval, its plane slopes from above downwards and forwards at an angle of 40° with that of the occipital region of the skull. This region, as before stated, is vertical in position (see fig. 1, Pl. XXI.), of a sub-semicircular form, the breadth being nearly one-third more than the height; it is bounded above and laterally by a pretty regular curve; but the superior margin is not produced so far backwards as in *Orycteropus*. The occipital plane is bisected by a mesial vertical ridge; there is a less developed transverse curved inter-muscular crest which runs parallel with and about half an inch below the marginal ridge: the surface of the occipital plane on the interspaces of these ridges is irregularly pitted with the impression of the insertion of powerful muscles. The corresponding surface is smooth in the *Orycteropus* and *Armadillos*; in the great extinct *Glossotherium* it resembles in character that of the *Scelidotherium*; but in the forward slope of the occipital plane the *Glossotherium* differs in a marked degree from the present animal.

The upper surface of the cranium is smooth and regularly convex. The extent of the origin of the temporal muscles is defined by a slightly-raised broad commencement of a ridge, which, in the older animal, might become more developed. There is no trace of this ridge in the *Orycteropus*; but it exists in the *Armadillos*, in which the teeth are of a denser texture, and better organized for mastication, and consequently are associated with better developed masticatory muscles. It will be subsequently shown that the *Scelidotherium* resembles the *Armadillos* in so far as it possesses a greater proportion of the dense ivory to the external cæmentum in its teeth, than does the *Megatherium*; while it differs widely from the *Orycteropus*, in the structure of its teeth. The teeth, however, are fewer in the *Scelidotherium* than in any *Armadillo*, and relatively smaller than in most of the species of that family. Accordingly we find that the zygomatic arches are relatively weaker; and in this particular the *Scelidotherium* corresponds with the *Orycteropus*. The zygomatic process of the temporal commences posteriorly about an inch and a half from the occipital plane, its origin or base is extended forwards in a horizontal line fully four inches, where it terminates as usual in a thin concave edge, as shown on the right side in Pl. XXII. The free portion of the zygoma, continued forwards from the outer part of this edge, is a slender sub-compressed process, half an inch in the longest or vertical diameter, and less than three lines in the transverse; the extremity of this process is broken off; the opposite extremity of the malar portion of the zygoma is entire, and obtusely rounded. The bony arch may have been completed by the extension of the temporal process to the malar one, but the two parts undoubtedly were not connected together by so extensive a surface as in



the Orycterope. On the other hand, if the zygomatic arch be naturally incomplete in the Scelidothera, the interspace between the malar and temporal portions must be relatively much less than in the Sloth or Ant-eater; for the broken end of the temporal part is separated from the obtusely rounded apex of the malar process in the present specimen by an interval of only one inch.

The articular surface (Pl. XXIII., fig. 2) beneath the zygoma for the lower jaw is flat and even, with the outer and inner margin slightly bent down, but having no definable anterior or posterior limits; its breadth is two inches. It differs from the corresponding surface in the Orycterope in being separated by a relatively wider interval from the tympanic bone, and in wanting consequently the support which the bony meatus auditorius gives in the Orycterope to the back part of the mandibular joint. The Armadillos differ still more from the Scelidothera in this important part of the cranial organization, inasmuch as the glenoid cavity is not only protected behind by the descending os tympanicum, but also in front by a corresponding vertical downward extension of the os malæ. The Scelidothera in the general form and relative position of the surface for the articulation of the lower jaw resembles the Glossothera more closely than any other Edentate animal with which I have been able to compare it.

The malar bone of the Megatherium presents, as is well known, two characters, in which it conspicuously differs from that of the Orycterope and Armadillos, and approximates in an equally marked degree to the Sloths; these characters consist in a process ascending as if to complete the posterior circumference of the orbit, and another process descending outside the lower jaw to give advantageous and augmented surface of attachment to the masseteric muscle, in its character of a protractor of the jaw. Now both these modifications of the malar bone are present in the Scelidothera, and are the chief if not the sole marks of the affinity to the Megatherium which the structure of the cranium affords. They are, however, the more interesting, perhaps, on that account, and because they are associated with other and more numerous characters approximating the species in question to the ordinary terrestrial as distinguished from the arboreal Edentata. For if the Scelidothera, instead of the Megathera, had been discovered half a century ago, and if its true nature and affinities had been in like manner elucidated by the genius and science of a Cuvier; and supposing on the other hand that the Megatherium instead of the Scelidothera had been one of the novel and interesting fruits of Mr. Darwin's recent exploration of the coast of South America, then the affinities of the Megathera with the Sloths would undoubtedly have been viewed from a truer point than at the time when, —the Scelidothera, and analogous transitional forms, being unknown,—it was regarded as a gigantic Sloth.

Having indicated the principal characters of the cranium of the Scelidothera,

which determine its affinities amongst the *Edentata*, there next remains to be considered the relative position, extent, and connections, of the different bones composing the cranium.

The occipital bone constitutes the whole of the posterior, the usual proportion of the inferior, and a small part of the upper and lateral portions of the cranial cavity: there is a small descending ex-occipital process immediately exterior to the condyle: above this part the occipital bone is articulated to the mastoid process of the temporal, and the supra-occipital plate is joined by a complex dentated lambdoidal suture to the two parietals, without the intervention of interparietal or Wormian bones; the course and form of the lambdoidal suture is shown in Pl. XXII; it has the same relative position as in the Orycterope; in the Armadillos, the suture runs along the angle between the posterior and superior surfaces of the skull. The thickness of the occipital bone, at this angle, in the Scelidothera, exceeds an inch, and its texture consists of a close massive diploë, between the dense outer and inner tables, (Pl. XXIII. fig. 1.)

The squamous portion of the temporal bone has a very slight elevation, not extending upon the side of the cranium more than half an inch above the zygoma; it is thus relatively lower than in the *Orycteropus*; but is similarly bounded above by an almost straight line, (Pl. XXI., fig. 1.) The mastoid process is small, compressed, with a rounded contour; immediately internal to it is a very deep depression, corresponding to that for the digastric muscle. But the most interesting features in this region of the temporal bone consist in the free condition of the tympanic bones, and the presence of a semicircular pit, immediately behind the tympanic bone for the articulation of the styloid element of the hyoid or tongue-bone: in these points we trace a most remarkable correspondence with the Glossothera, and in the separate tympanic bone the same affinity to the *Orycteropus*, as has been already noticed in the more bulky extinct Edental.

This correspondence naturally leads to a speculation as to the probable generic relationship between the Glossothera and Scelidothera: now it may first be remarked that the styloid articular depression is relatively much larger and much deeper in the Glossothera than in the Scelidothera; in the former its diameter equals, as we have seen, one inch; in the Scelidothera it measures only a third of an inch, the whole cranium being about two-fifths smaller; if we turn next to the anterior condyloid foramina, which in the Scelidothera are double on each side, we obtain from them evidence that the muscular nerve of the tongue could only have been one-third the size of that of the Glossothera. These proofs of the superior relative development of the tongue in the Glossothera indicate a difference of habits, and a modification, probably, of the structure of the locomotive extremities; and when we associate these deviations from the Scelidothera, with



the known difference in the position of the occipital plane, which in the *Glossothere* corresponds with that in the *Myrmecophaga* and *Bradypus*, we shall be justified in continuing to regard them, until evidence to the contrary be obtained, as belonging to distinct genera.

The parietal bones present an oblong regular quadrate figure, the sagittal suture running parallel with the squamous, and the frontal with the lambdoidal suture; there is scarcely any trace of denticulations in the sagittal suture; the bones are of remarkable thickness, varying, at this suture, from six to nine lines, and their opposed surfaces are locked together by narrow ridges, which slightly radiate from the lower to the upper part of the uniting surface: the substance of the bone consists of an uniform and pretty dense diploë; and there are no sinuses developed in it. We can hardly regard the extraordinary air-cells which occupy the interspace of the two tables of the skull in the parietal and occipital bones of the *Glossothere* (Pl. XVI., fig. 3) as a difference depending merely on age.

The frontal and æthmoid bones are broken away in the present cranium. The sphenoid commences two inches in front of the foramen occipitale; the fractured state of the skull does not allow its anterior or lateral limits to be accurately defined; its body is occupied with large air-sinuses; the only part, indeed, of this bone which is exposed to observation is that which forms part of the floor of the cranium; and this we shall now proceed to describe, in connexion with the other peculiarities of the cranial cavity, (fig. 1. Pl. XXIII.) The body of the sphenoid is impressed on its cranial surface with a broad and shallow sella turcica (*a*), bounded by two grooves, (*b b*), leading forwards and inwards from the carotid foramina (*c*); the line of suture between the sphenoid and occipital bones runs along a slight transverse elevation (*d*), which bounds the sella posteriorly; this suture is partially obliterated: a slight median protuberance (*e*) bounds the sella turcica anteriorly; there are neither anterior nor posterior clinoid processes. External to the carotid channel there is a wide groove (*f*) leading to the foramen ovale (*g*); this foramen is about one-third smaller than in the *Glossothere*, and therefore, as compared with the anterior condyloid foramina, indicates that the tongue was endowed with a greater proportion of sensitive than motive power in the *Scelidothere*: but in reasoning on the size of this nerve, it must be remembered that in both animals certain branches, both of the second and third divisions of the fifth pair of nerves, are to be associated with the persistence of large dental pulps, of which they regulate the secreting power. Anterior to the foramen ovale, and at the termination of the same large common groove, lodging the trunk of the fifth pair of nerves is the foramen rotundum (*h*); this leads to a very long canal, the diameter of which is five lines, being somewhat less than that for the third division of the fifth pair. The anterior sphenoid is broken away, so that no observation can be made on the optic foramina.

The basilar process of the occipital bone is perforated at its middle by two small foramina (*i*) on the same transverse line, about half an inch apart.

In the Armadillo these foramina do not exist: in the *Orycterope* they are present, but open beneath an overhanging ridge, which is continued from them to the upper part of the anterior condyloid foramen on each side. The sella turcica of the *Orycterope* is deeper and narrower than in the *Scelidothere*; and is separated from the basilar occipital process by a transverse ridge, which sends forward two short clinoid processes; two smaller anterior clinoid processes project backwards from the angle of the anterior boundary of the sella turcica. The foramina ovalia and rotunda open in the same continuous groove, as in the *Glossothere* and *Scelidothere*, but they are relatively wider apart; and the canal for the third division of the fifth pair is shorter, and runs more directly outwards.

The petrous bone in the *Scelidothere* is relatively larger than in the *Glossothere*, but this probably arises from the precocious development of the organ of hearing in the present immature specimen in obedience to the general law. The trunk of the fifth pair of nerves does not impress it with so deep and well defined a groove as in the *Glossothere*; the elliptic internal auditory foramen (*k*) is situated about the middle of the posterior surface; behind this is the aqueductus vestibuli; and immediately posterior to the petrous bone is the foramen jugulare (*l*): the shape of the os petrosum agrees more with that of the Armadillo than with that of the *Orycterope*. An accidental fracture of the right os petrosum demonstrates its usual dense and brittle texture, and at the same time has exposed the cochlea with part of its delicate and beautiful lamina spiralis. The conservation of parts of the organs of vision in certain fossils, has given rise to arguments which prove that the laws of light were the same at remote epochs of the earth's history as now; and the structures I have just mentioned, in like manner, demonstrate that the laws of acoustics have not changed, and that the extinct giants of a former race of quadrupeds were endowed with the same exquisite mechanism for appreciating the vibrations of sound as their existing congeners enjoy at the present day.

The brain, being regulated in its development by laws analogous to those which govern the early perfection of the organ of hearing, appears to have been relatively larger in the *Scelidothere* than in the *Glossothere*: it was certainly relatively longer; the fractured cranium gives us six inches of the antero-posterior diameter of the brain, but the analogy of the *Orycterope* would lead to the inference that it extended further into the part which is broken away. The greatest transverse diameter of the cranial cavity is four inches eight lines: these dimensions, however, are sufficient to show that the brain was of very small relative size in the *Scelidothere*; and, both in this respect, and in the relative position of its principal masses, the brain of the extinct Edental closely accords with the general character of this organ in the existing species of the same Order. We perceive by the obtuse



ridge continued obliquely upwards from above the upper edge of the petrous bone, that the cerebellum has been situated wholly behind the cerebrum; we learn also from the same structure of the enduring parts that these perishable masses were not divided, as in the *Manis*, by a bony septum, but by a membranous tentorium, as in the *Glossothere* and *Armadillos*: in the *Orycteropus*, as has been before remarked, there is a strong, sharp, bony ridge extending into each side of the tentorium. The vertical diameter of the cerebellum and medulla oblongata equals that of the cerebrum, and is two inches three lines: the transverse diameter of the cerebellum was about three inches nine lines; its antero-posterior extent about one inch and a half. The sculpturing of the internal surface of the cranial cavity bespeaks the high vascularity of the soft parts which it contained, and there are evident indications that the upper and lateral surfaces of the brain had been disposed in a few simple parallel longitudinal convolutions. The two anterior condyloid foramina (*m*) have the same relative position as the single corresponding foramen in the *Glossothere*, *Orycteropus*, and *Armadillos*, and the inner surface of the skull slopes outwards from these foramina to the inner margin of the occipital condyle.

Of the bones of the face there remain only portions of the malar, lachrymal, palatine, and maxillaries. The chief peculiarities of the malar bone have been already noticed: the breadth of the base of the descending masseteric processes is two inches two lines; its termination is broken off: the length of the ascending post-orbital process of the malar cannot be determined from the same cause, but it is fortunate that sufficient of this part of the cranium should have been preserved to give this evidence of the affinities of the *Scelidothera* to the *Megathere*. The malar bone is continued anteriorly, in a regular curve forwards and upwards, to the lachrymal bone, and completes, with it, the anterior boundary of the orbit: the size of the orbit is relatively smaller than in the *Orycteropus*, and still less than in the *Ant-eaters*: here, however, we have merely an exemplification of the general law which regulates the relative size of the eye to the body in the mammalia. The malar bone does not extend so far forwards in front of the orbit as in either the *Orycteropus* or *Armadillo*; in the inclination, however, with which the sides of the face converge forwards from the orbits, the *Scelidothera* holds an intermediate place between the *Armadillos* and *Orycteropus*.

The lachrymal bone does not extend so far upon the face in the *Scelidothera* as in the *Orycteropus*; in which respect the *Scelidothera* resembles more the *Megathere*. The foramen for the exit of the infra-orbital nerve has the same situation near the orbit as in the *Megathere*; its absolute distance from the anterior border of the orbit is only half that in the *Orycteropus*. The foramen is single in the *Scelidothera*, as in the *Orycteropus*; in the *Megathere* there are two or three antorbital foramina. The vertical diameter of this foramen is eight lines, the transverse diameter four lines. So much of the outer surface of the superior maxillary bones as has been pre-

served, is smooth and vertical. Each superior maxillary bone contains the sockets of five teeth, occupying an antero-posterior extent of three inches seven lines, (Pl. XXII and XXIII. fig. 3). The posterior alveolus is situated just behind the transverse line, extending across the anterior boundary of the orbits; the remaining sockets of the molar series extend forwards three inches in front of the orbits. In the *Megathere*, the roots of the five superior molars are all situated behind the anterior boundary of the orbit: in the *Orycteropus*, on the contrary, the grinders are all placed in advance of the orbit; so that the *Scelidothera* resembles that species more than the *Megathere* in the relative location of the teeth. The palatal interspace between the roots of the last molar tooth of each series is eleven lines; the palate gradually though slightly widens, as it advances forwards: the posterior margin of the palate is terminated by an acute-angled notch. In the breadth of the bony palate the *Scelidothera* is intermediate between the *Megathere* and *Orycteropus*.

The anterior of the upper molars is represented at fig. 3, 4, and 5, Pl. XXI., and at 1, fig. 3, Pl. XXIII.; it corresponds closely in form and size with the opposite molar below; the base of the triangle given by its transverse section is turned inwards and obliquely forwards.

The second molar of the upper jaw, also presents in transverse section a triangular form, with the angles rounded off; but the inner side of the tooth is traversed by a longitudinal groove. The largest diameter of the transverse section, which is placed obliquely as regards the axis of the skull, measures ten lines and a half; the opposite diameter of the tooth is six lines.

The third and fourth molars present the same form and size, and relative position as the second.

The fifth molar is the smallest of the series; its transverse section gives an inequilateral triangle, with the corners rounded off; the broadest side is turned outwards, and is slightly concave; the antero-posterior diameter of this tooth is seven lines; the transverse four lines. The length of the teeth in the upper jaw is about two inches and a half.

It is almost superfluous to observe that the teeth of the *Scelidothera*, as in other *Bruta*, are without fangs, and have their inserted base excavated by large conical cavities, for the lodgment of a persistent pulp. The tooth is composed of a small central body of coarse ivory or 'dentine,' traversed by medullary canals, which at the periphery of the coarse dentine anastomose by loops, from the convexity of which the calcigerous tubes are given off which form the fine dentine: the layer of this substance, which immediately surrounds the coarse dentine, is about one line and a half in thickness, and the whole is invested with a very thin coating of cement. The teeth of the *Scelidothera* thus



present a more resisting structure than do those of the *Mylodon*; having a larger proportion of the dense ivory composed of the minute calcigerous tubes, and a much smaller proportion of the softer external cæmentum; in this respect the *Scelidothera* recedes farther from *Megathere*, and approaches nearer the *Armadillos* than does the *Mylodon*.

The lower jaw resembles, in the general form of the posterior moiety which is here preserved, that of the *Sloth* and *Mylodon* more than that of any other Edentate species. Its deep posterior angle is produced backwards, and a broad coronoid process rises and nearly fills the zygomatic space; the condyle is flat, as the glenoid surface has already indicated; its transverse diameter is an inch and eight lines; its antero-posterior diameter seven lines: it is principally extended inwards beyond the vertical line of the ascending ramus. The lower contour of the jaw describes an undulating line; which, commencing from the posterior angle, is at first gently convex, then slightly concave, then again convex, below the alveoli of the teeth, where it is rounded and expanded, as in the *Orycterope*. The fractured condition of the right ramus of this part fortunately exposed the roots of the four grinding teeth, which constitute the dental series on each side of the lower jaw. The length of the jaw occupied by these four alveoli is three inches ten lines, which exceeds a little that of the opposed five grinders above; the ramus of the jaw gradually diminishes in all its dimensions anterior to the molar teeth; the dental canal passes in a gentle curve below, and on the inner side of the alveoli, whence it gradually inclines to the outer wall of the jaw.

The whole ascending ramus of the jaw consists of a very thin plate of bone; it is slightly concave on the inner side, and the inferior margin of the produced angle inclines inwards, as in the *Mylodon* and *Sloth*; it is impressed on the outer side with two shallow depressions, and two parallel ridges, both following the gentle curvature of the part. There is a foramen on the outer side of the ramus at the anterior part of the base of the coronoid process corresponding with that in the lower jaw of the *Mylodon*, but the longitudinal channel which runs along the outer side of the alveolar processes is wanting, and the expansion at the base of those processes is more sudden and relatively greater; the general correspondence, however, between these lower jaws is such as would lead to the idea that they belonged to animals of the same genus, were it not that the teeth present modifications of form in the *Scelidothera*, as distinct from those of the *Mylodon*, as are any of the minor dental differences on which genera or sub-genera of existing *Mammalia* are founded in the present state of Zoological Classification.

To make this distinction more readily intelligible, I have given a view of the transverse section of the teeth in the right ramus of the lower jaw (fig. 4, Pl. XXIII.), corresponding with that of the *Mylodon Darwinii*, (Pl. XVII., fig. 5). In the present

sub-genus the antero-posterior extent of the four alveoli of the lower jaw nearly equals four inches, and is relatively greater than in the *Mylodon*, although the teeth are placed closer together; this is owing to their greater relative size. The first molar tooth presents the simplest form; its transverse section is a compressed inequilateral triangle with the angles rounded off; the longest diameter of this section which is parallel with the inner alveolar border is eleven lines, the transverse diameter almost six lines; the base or broadest side of the triangle is turned inwards, and is slightly concave; the two smaller sides are also slightly concave.

The second molar is placed more obliquely in the jaw; the long axis of its transverse section intersects at an acute angle that of the jaw itself; the transverse section presents a compressed or oblong form, with the larger end next the outer side, and the smaller end next the inner side of the jaw; this end is simply rounded, but the outer end presents a sinuosity, corresponding to a broad groove which traverses the whole length of the outer side of the tooth; the anterior, which corresponds to the internal side or base of the transverse section of the preceding molar, is slightly concave.

The third molar has nearly the same form and relative position as the preceding; the long diameter of the transverse section is, in both, ten lines and a half; the principal transverse diameter is, in the second molar five lines, in the third nearly six; the difference of form observable in these as compared with the two middle grinders of the *Mylodon* is well marked; in the latter these teeth are impressed with a longitudinal groove on their inner sides; in the *Scelidothera* they have a similar impression along their outer but not along the inner side.

In the last molar the resemblance is much closer, and the modification of form by which it differs from the preceding ones is of the same kind; the transverse section gives an irregular oblong figure with its axis nearly parallel with that of the jaw, and constricted at the middle by sinuosities produced by two wide channels which traverse longitudinally, one the outer, the other the inner side of the tooth; the latter groove is much wider and shallower in the *Scelidothera* than in the *Mylodon*. The two lobes produced by these grooves are more equal in *Scelidothera*; the anterior one is concave on its anterior surface instead of convex as in the *Mylodon*; the posterior one is more compressed; the longitudinal or antero-posterior diameter of the transverse section of this tooth is one inch five lines; the greatest transverse diameter is nine lines; the diameter of the isthmus joining the lobes is three lines and a half; the entire length of this tooth is three inches three lines.\*

\* It requires little stretch of imagination to conceive that this more complex posterior tooth (Pl. XXIII, fig. 4, 4) in the lower jaw is the representative of the two smaller posterior teeth (ib. fig. 3, 4, and 5) of the upper jaw conjoined.



## VERTEBRAL COLUMN.

Of this part of the skeleton of the Scelidothera, Mr. Darwin's specimen includes, as is represented in Plate XX., the cervical, part of the dorsal, and the sacral series of vertebræ in a more or less perfect condition.

The cervical vertebræ present the ordinary mammalian number, seven, and are free, or so articulated as to have permitted reciprocal movement upon each other. Their transverse processes are perforated as usual for the vertebral arteries. These processes in the atlas are remarkable for their great breadth, length, and thickness; and indicate the muscular forces which must have worked the head upon the spine to have been very powerful. The axis is provided with a robust 'processus dentatus,' having a base equal in breadth to the body of the axis itself; and a smooth articular convexity on the side of the apex on which the ring of the atlas rotated. The line of union between the axis and its characteristic process, which here resembles the body of an abortive vertebra, is very distinct. The transverse processes of the vertebra dentata are comparatively feeble, but this condition is amply compensated for by the great development of the spinous process. (Pl. XXIV. fig. 1.) This process is bent backwards at nearly a right angle, overlaps with its reflected extremity the spine of the third cervical vertebra, and rests by its base, on the under part of which are the posterior articular surfaces, upon the broad and strong anterior oblique processes of the third vertebra.

The third, fourth, fifth, and sixth cervical vertebræ have moderately developed and pointed spinous processes: their transverse processes are broad, and extend obliquely backwards, and slightly overlap each other. On the under part of the transverse process of the sixth cervical vertebra there is the fractured base of what I conjecture to have been an expanded aliform plate, analogous to that observable in the corresponding vertebra of the Orycterope. The seventh cervical vertebra has part of the articular depression for the head of the first rib upon each side of its body: the transverse process is feebly developed, but the spine is double the height and size of those of the preceding vertebræ.

The spinous process of the first dorsal vertebra in like manner rises to twice the height of the preceding spine of the seventh cervical, and preserves an equal antero-posterior diameter from its base to its summit, which is thick and slightly bent backwards: four or five succeeding dorsal vertebræ give evidence of having been surmounted by spines of equal height and strength. The transverse processes of these dorsal vertebræ present bold concavities on their inferior part for the reception of the tubercles of the ribs, and they gradually ascend upon the base of the spines as the vertebræ are placed further back, so as to increase the expansiveness

of the chest. The state of the fossil did not afford further information as to the condition of this part of the vertebral column, but the parts which have been preserved are precisely those from which the most interesting inferences as to the affinities and habits of the extinct quadruped can be deduced.

Whether the Megatherium be most nearly allied to the tribes of the Sloth or Armadillo has been a question under recent discussion, and, as a corollary of this problem, whether its habits were those of a scansorial or of a fossorial quadruped. For, strange as it may appear at first sight, there have not been wanting arguments, and those urged by an anatomist to whom we owe much novel and interesting information respecting the extinct Edentata, in support of the belief that the Megatherium, gigantic and ponderous as must have been its frame, actually climbed trees like a Sloth, and had claws and feet organised for prehensile actions, and not in accordance with that type by which they are usually adapted for digging up the soil.\*

Now, in whatever degree the Megatherium may be involved in this question, the smaller Megatherioid species at present under consideration must be at least equally implicated in it. In the adaptation of the frame of a mammiferous quadruped for especial and peculiar actions and modes of life, such as for climbing and living in trees, or for burrowing and seeking concealment in the earth, not only the immediate instruments, as the feet, are modified, but the whole of the osseous and muscular fabric is more or less impressed with corresponding adaptations, whilst at the same time these special adjustments are invariably subordinated to the type of organization which characterizes the group.

The type of the order *Bruta* or *Edentata* is well-marked; one or more claws of unusual length and strength, characterize the fore-feet and sometimes the hind-feet in every genus, and the term 'Macronychia' would more aptly designate them than the term which Cuvier substituted for the good old Linnæan appellation. The uniform absence of true roots to the teeth, where these are present, is another general character; the skeleton exhibits many well-marked peculiarities common to the whole order; while at the same time it is modified in various modes and degrees in accordance with the peculiar habits and exigencies of the species.

One of the regions of the skeleton which manifests adaptive modifications of this kind in the most remarkable degree is the cervical division of the vertebral column. In one edentate species it is lengthened out by two additional vertebræ more than in any other mammal; in another it is reduced by ankylosis to as great an extent below the regular number of moveable pieces: and these, the two most opposite conditions of the cervical vertebræ which are to be met with in the mammiferous class are related to equally diverse and opposite habits of life.

\* Lund, Videnskabernes Selskabs, Natur: og Mathem. Afhandlinger, Kiöbenhavn, vol. viii.



With respect to the *Ai*, or three-toed Sloth, "an animal, great part of whose life, when not engaged in eating, is spent in sleeping on trees,—an easy attitude for repose is most essential to its comfortable existence; and accordingly we find, that the auxiliary vertebræ at the base of the neck contribute to produce that flexibility of this organ which allows the head of the animal to incline forwards and rest upon its bosom." Dr. Buckland, from whose Paper on the "Adaptation of the Structure of the Sloths to their peculiar Mode of Life,"\* the preceding judicious physiological remark is quoted, adduces the authority of Mr. Burchell in proof that the Sloth can in a remarkable manner and with great facility twist its head quite round, and look in the face of a person standing directly behind it, while at the same time the body and limbs remain unmoved. A single glance at the length and slenderness of the cervical region of the spine, and of the feeble condition of the transverse and spinous processes in the vertebræ composing that part of the skeleton of the Sloth, is enough to show its adaptation to increase the rotatory motion and flexibility of the neck.

In describing the skeleton of a species of Armadillo (*Dasypus 6-cinctus*, Linn.)† I was led in like manner to point out the subserviency of the peculiarities of the cervical vertebræ to the habits and mode of life of that animal; observing that the "anchylosis of the cervical vertebræ obtains in the *Cetacea*, as well as in the genus *Dasypus*, and that as in the aquatic order this firm connexion of the cervical vertebræ assists materially in enabling the head to overcome the resistance of the dense fluid through which they perpetually move, so in the Armadillos a like advantage may be derived from this structure during the act of displacing the denser material in which they excavate their retreats."‡

Having in view these well-marked examples of the subserviency of the structure of the bones of the neck to the habits of existing species of the order *Bruta*, I proceeded to investigate the structure of the corresponding part of the skeleton in the *Scelidotherium*, hoping thereby to gain a new and useful element in the determination of the problem at present under discussion, as to the affinities and habits of the extinct Megatherioid quadrupeds.

The fossil, in its original state, yielded a view of so much of the anterior part of the bodies of the cervical vertebræ as proved that they were neither so numerous as in the Sloth, nor ankylosed together as in the Armadillos: after a long and careful chiselling at the hard matrix in which they were imbedded, the trans-

\* Linn. Trans. vol. xvii. (1833) p. 17.

† Zool. Proceedings, 1832, p. 134.

‡ The anterior prolongation of the sternum in front of the neck and the corresponding anterior position of the clavicles and scapulæ occasions a transference of such a proportion of the moving powers of the head from the cervical vertebræ to these bones in the mole, as renders any modifications of these vertebræ, like those in the Armadillo, uncalled for.

verse and spinous processes were exposed to view, as they are represented in Plates XX. and XXIV. The description of these processes has already been given.

On comparing the cervical vertebræ of the *Scelidotherium* with those of the existing *Bruta*, the closest resemblance to them was found in the skeleton of the *Orycterope*. Now this quadruped, though not so rapid a burrower, or so strictly a subterranean species as the Armadillos, participates, nevertheless, to a certain extent, in their fossorial habits, and is closely allied to them in general structure: it differs from them, indeed, mainly in a modification of the dental system, in the absence of dermal armour, and of ankylosis of the cervical vertebræ. But the advantages which, as a burrower, it would have derived from the latter structure, are compensated for by the shortness of the cervical vertebræ, and by the great development and imbricated or interlocking co-adaptation of the transverse and anterior spinous processes of the cervical vertebræ. The analogous quadruped in the South American Continent—the great ant-eater (*myrmecophaga jubata*) which uses its powerful compressed fossorial claws for breaking through the hard walls of the habitations of its insect prey, but which does not excavate a subterraneous retreat for itself, presents the cervical vertebræ of a more elongated form, and without that development of the spinous and transverse processes which tend to fix the neck and increase the size of the muscles which move the head: and, if we could conceive that its fore-feet were employed to scratch up vegetable roots, instead of disinterring termites, there would be no reason to expect any modification of the cervical vertebræ as a direct consequence of such a difference in the application of its fossorial extremities: when, therefore, we find that the cervical vertebræ do actually differ in two myrmecophagous species, to the extent observable in the Cape and South American ant-eaters, we arrive legitimately at the conclusion that such difference relates to fossorial habits of the one species, in which habits the other does not participate.

Now, therefore, if this conclusion be just in regard to the *Orycterope*, it must bear with more force upon the question of the habits of the *Scelidotherium* as the mechanism for strengthening the connection of cervical vertebræ, and for augmenting the surface of attachment of the muscles which worked the head and neck, is more strongly wrought out in that extinct species.

The great size and strength of the spinous process of the dentata, and the mode in which it is interlocked with the spinous and oblique processes of the third cervical, together with the imbricated disposition of the transverse processes of this and the succeeding vertebræ, and the remarkable height of the dorsal spines, all combine to indicate in a very striking manner, if not to demonstrate, that the conical head of the present species, which is comparatively small and slender, and



for its own mere support requiring therefore no such mechanism, was used in aid of the fossorial actions of the extremities.

As the cervical vertebræ of the Megatherium have their processes comparatively weaker than in the Scelidotherium, and the anterior dorsal spines are relatively shorter, it may be concluded, that whatever were the extent or nature of the fossorial labours of the enormous claws with which it was provided, the head did not co-operate with the digging implements in their especial task in the same degree as in the Scelidotherium and Orycteropus. At the same time there is no modification of the cervical region of the spine of the Megatherium corresponding with those which we have seen to be subservient to the arboreal habits of the sloth, a remark which will not be deemed superfluous by those who have perused the acute observations and arguments adduced by M. Lund in favour of the scansorial character of the extremities of the Megatherium and Megalonyx.

The fragments of the dorsal vertebræ and ribs of the Scelidotherium, which are figured in Plate XX, offer no modifications which need detain our attention; they closely conform, excepting in the greater relative height of the anterior dorsal spines, already noticed, with the Megatherioid type. The sacrum manifests in its vast expanse, the great development of the posterior transverse processes to join the ischium, the capacious medullary cavity, and wide nervous foramina, a like conformity with the Megatherium, and a corresponding harmony with the disproportionate bulk of the hind legs.

#### BONES OF THE EXTREMITIES.

The Scapula in its double spine, the osseous arch formed by the confluence of the acromion with the coracoid process, and the substitution of a distinct foramen for the suprascapular notch, agrees with that of the Megatherium: but the span of the acromial arch is relatively wider, and the surface for the articulation of the clavicle is better marked. This articular surface, which is distinctly shewn upon the acromion of both the scapulæ in Pl. XX, is the more interesting, as being the only evidence of the clavicle of the Scelidotherium which we at present possess; but it is enough to prove that this quadruped enjoyed all the advantages in the actions of the fore-extremity, which arise out of the additional fixation of the shoulder-joint afforded by the clavicle—a bone which the extinct Megatherioids are the largest of the mammiferous class to possess in a completely developed state. The form, position, and aspect of the glenoid cavity for the humerus closely correspond with the condition of the same part in the Megatherium. The limits of the acromial and coronoid portions of the arch were still defineable in the

present skeleton, which indicates the nonage of the individual in the unanchylosed condition of most of the epiphyses.

In regard to the presence of a clavicle in the Megalonyx M. Lund has deduced certain conclusions, which, if well founded, would be equally applicable to the present allied species, and to the great Megatherium. I am induced, therefore, to offer a few physiological observations on that bone, which appear to me to lead to a more correct interpretation of its uses and relations in the great mammiferous animals now under consideration.

When the anterior extremities in mammalia are used simply for the purpose of progressive motion on dry land, as in the Pachyderms and Ruminants, or in water, as in the Cetaceans, there is no clavicle; this bone is introduced between the sternum and acromion, in order to give firmness and fixity to the shoulder-joint when the fore-leg is to discharge some other office than that of locomotion. In these cases, however, the clavicle exists in various degrees of development, and even its rudiment may be dispensed with in some of the actions which require a considerable extent of lateral or outward motion, and of freedom of rotation of the fore-limb. When, therefore, we find the clavicle fully developed in the skeleton of an extinct mammiferous animal, and so placed as to give the humeral articulation all the benefit of this additional mechanism, we may confidently expect that it will afford an insight into the habits and mode of life of such extinct species. M. Lund\* has argued from the clavicle of the Megalonyx, that it climbed like a Sloth. "Animals," says Sir C. Bell,† "which fly or dig, or climb, as Bats, Moles, Porcupines, Squirrels, Ant-eaters, Armadillos, and Sloths, have this bone; for in them, a lateral or outward motion is required." But in regard to the present problem, we have to enquire whether the clavicle manifests any modifications of form, of strength, or development in relation to the special differences of these several actions, with which its presence is asserted to be associated?

In mammals which fly, the clavicle is always complete: the rabbit, the fox, and the badger are instances of burrowing animals in which the clavicle is absent or rudimental. The presence of a perfect clavicle is not more constant in climbing quadrupeds. The Ai, for example, has an incomplete clavicle, which is attached to the acromion process, and terminates in a point about one-fourth of the distance between the acromion and the top of the sternum, to which the clavicular style is attached by a long slender ligament: the advantage, therefore, which a perfect clavicle affords in the fixation of the shoulder-joint, is lost to this climber *par excellence*. Again, the Bears, which are the bulkiest quadrupeds that are gifted with the faculty of climbing, and this in so perfect a degree that the Sun-bears of the Eastern Tropics may be termed arboreal animals,—these scan-

\* Loc. cit.

† Bridgewater Treatise, p. 46.



social quadrupeds are destitute of even the smallest rudiment of a clavicle, as I have ascertained by repeated careful dissection.

Since, therefore, a clavicle in any degree of development is not essential to a climbing quadruped, we must seek for some other relation and use of that remarkably strong, and perfect bone, as it exists in the *Megathere*, *Megalonyx*, and *Scelidotherium*. The absence of 'dentes primores' or of anterior or incisive teeth in these quadrupeds at once sets aside any idea of its connection with an action of the fore extremities, very common in the mammals which possess clavicles, viz., that of carrying the food to the mouth, and holding it there to be gnawed by the teeth. Flying is of course out of the question, although our surprise would hardly be less at seeing a beast as bulky as an elephant climbing a tree, than it would be to witness it moving through the air. If now we restrict our comparison to the relations of the clavicle in that order of Mammalia to which the extinct species in question belonged, we shall see that it is most constant, strongest, and most complete in those species which make most use of their strong and long claws in displacing the earth, as the *Armadilloes* and *Orycteropus*: and, as the clavicle is incomplete in one climbing Edental, we are naturally led to conclude that its perfect development in an extinct species must have been associated with uses and relations analogous to those with which it coexists in other genera of the same order. Thus it will be seen, that, in rejecting the conclusion drawn by M. Lund from the presence of a clavicle, I concur in the opinion expressed by Dr. Buckland\* that the *Megatherium*—and with it the *Megalonyx* and *Scelidotherium*—had the shoulder-joint strengthened by the clavicle, in reference to the office of the fore-arm, as an instrument to be employed in digging roots out of the ground. Not, however, that these gigantic quadrupeds fed on roots, but rather, as the structure of the teeth would show, on the foliage of the trees uprooted by the agency of this powerful mechanism of the fore-legs, and of the otherwise unintelligible colossal strength of the haunches, hind-legs, and tail.

The humerus presents a large convex oval head, on each side of which is a tuberosity for the implantation of the supra- and sub-scapular muscles: these tuberosities do not rise above the articular convexity, so as to restrict the movements of the shoulder-joint, as in the Horse and Ruminants, but exhibit a structure and disposition conformable to those which characterize the proximal extremity of the humerus in other mammalia which enjoy rotatory movements of the upper or fore-limb. The tuberosities are, however, relatively more developed, and give greater breadth to the proximal end of the humerus in the *Scelidotherium* than in the *Megathere*. The distal end of the humerus, although mutilated, clearly indicates that it had the same characteristic breadth of the external and internal

\* Bridgewater Treatise, p. 152.

condyles, as in the *Megatherium*. In fig. 1. Pl. XXV. which gives a front view of the left humerus, the broad internal condyle, with its extremity broken off, is seen projecting to the left hand; both in this figure and in fig. 2. in which the internal side of the humerus is turned towards the observer, the wide groove, with its two osseous boundaries, is shewn, which plainly indicates that the left condyle was perforated for the direct passage of the artery or median nerve, or of both, to the fore-arm. The groove for the musculo-spiral nerve on the outer side of the humerus is over-arched at its upper part by a strong obtuse process; which is comparatively less developed in the *Megatherium*. The trochlear or inferior articular surface of the humerus presents, as in the *Megatherium*, two well-marked convexities, with an intervening concavity: this indication of the rotatory power of the fore-leg is confirmed by the form of the head of the radius.

In Pl. XXV. fig. 4. a view is given of this articular surface: it presents the form of a subcircular gentle concavity, which plays upon the outer convexity of the humeral articular surface: immediately below the upper concavity the radius presents a lateral smooth convex surface, which rotates upon a small concavity on the ulna, analogous to the 'lesser semilunar,' in human anatomy, in which the mechanism for rotation, so far as the upper joint of the radius is concerned, is not more elaborately wrought out than in the present extinct edentate quadruped. The radius expands as it proceeds to the elbow-joint, where it attains a breadth indicative of the great power and size of the unguitate paw, of which it may be called the stem, and to the movements of which it served as the pivot.

All the bones of the fore-limb just described—the scapula, the humerus, and the radius,—indicate by the bold features and projections of the muscular ridges and tubercles the prodigious force which was concentrated upon the actions of the fore-paw, and the ulna, in its broad and high olecranon (of which a side-view is given in fig. 2. Pl. XXV.) gives corresponding evidence. The great semilunar concavity is traversed by a sub-median smooth ridge, which plays upon the interspace of the two humeral convexities. The body of the bone is subcompressed, straight, and diminishes in size as it approaches the carpal joint: the immediate articulating surfaces are wanting in both the radius and ulna, the epiphysial distal extremities having become detached from their respective diaphyses.

Of the terminal segment of the locomotive extremities, the only evidence among the remains of the skeleton of the *Scelidotherium* is the ungueal phalanx figured at Pl. XXVII. 3, 4, and 5; but as it is uncertain whether it belong to the fore or hind-foot, it will be described after the other bones of the extremities have been noticed.

Of these bones the femur is the most remarkable, both for its great proportional size, and its extreme breadth, as compared with its length or thick-



ness: but in all these circumstances the affinity of the Scelidotherium with the Megatherium is prominently brought into view. There is no other known quadruped with which the Scelidotherium so closely corresponds in this respect. In proceeding, however, to compare together the thigh-bones of these two extinct quadrupeds, several differences present themselves, which are worthy of notice: of these the first is the presence in the Scelidotherium of a depression for a 'ligamentum teres' on the back part of the head of the femur, near its junction with the neck of the bone: this is shewn in the posterior view of the femur given in Pl. XX. The head itself forms a pretty regular hemisphere: the great trochanter does not rise so high as in the Megatherium, but, relatively, it emulates it in breadth: the small trochanter is proportionally more developed: the external contour of the shaft of the femur is straighter in the Scelidotherium than in the Megatherium, and the shaft itself is less bowed forwards at that part. The articular condyles occupy a relatively smaller space upon the distal extremity of the femur in the Scelidotherium, and they differ more strikingly from those of the Megatherium, in being continued one into the other: the rotular surface, for example, which is shewn in fig. 5. Pl. XXV. is formed by both condyles, while in the Megatherium it is a continuation exclusively of the external articular surface.

The patella, which works upon the above-mentioned surface, is a thick strong ovate bone, with the smaller end downwards: rough and convex externally, smooth on the internal surface, which is concave in the vertical and convex in the transverse directions.

Of the bones of the leg only the proximal end of the tibia is preserved; but this is valuable, as shewing another well-marked difference between the Scelidotherium and Megatherium; for whereas in the latter the fibula is ankylosed with the tibia, this bone, in the Scelidotherium, presents a smooth flat oval articular surface, which is shewn in fig. 2. Pl. XXVII. below the outer part of the head of the bone; from the size and appearance of which, I infer, that the fibula would not have become confluent with the tibia, even in the mature and full-grown animal.

The relative length of the fore and hind extremities cannot be precisely determined from the present imperfect skeleton of the Scelidotherium; but there is good evidence for believing, that the fore extremity was the shortest. The humerus is shorter than the femur by one-ninth part of the latter bone; and the radius, which wants only the distal epiphysis, must have been shorter than the humerus. Now the relative development of the fore and hind legs is one of the points to be taken into consideration in an attempt to determine the habits and nature of an extinct mammal.

In climbing animals the prehensile power is more essential to the hinder than to the fore parts or extremities. In the leech the principal sucker is in the tail;

and higher organized climbers, in like manner, depend mainly on their posterior claspers in descending trees, and hold on by means of them whilst selecting the place for the next application of those at the fore part of the body, whether their place be supplied by the beak, as in the Maccaws, or the fore-feet or hands in the Mammalia.

But, although we perceive the hinder limbs to be the last to lose the advantageous structure of the hand in the Quadrumanous species, and notwithstanding that the tail is for this purpose sometimes specially organized to serve as a prehensile instrument, yet we find that the power of grasping the branches of trees by either legs or tail is never maintained at the expense of undue bulk and weight of those organs. On the contrary, as the fore-limbs are the main instruments in the active exertions of climbing, so they are the strongest as well as the longest in all the best climbers, and the weight of the body which they have to drag along is diminished by dwarfish proportions of the hinder limbs, as in the Orangs and the Sloths.

Can those huge quadrupeds have been destined to climb that had the pelvis and hinder extremities more ponderous and bulky in proportion to the fore-parts of the body than in any other known existing or extinct vertebrate animals?

M. Lund argues for the scansorial character of the Megalonyx, because its anterior extremities are longer than the posterior ones; but if they somewhat exceed the hind-legs in length, how vastly inferior are they in respect of their breadth and thickness. The prehensile faculty of the hinder limbs of the best climbers, as the Sloths, Orangs, and Chameleons is by no means dependent on the superior mass of muscle and bone which enters into their conformation, but is associated with the very reverse conditions.

It is impossible to survey the discrepancy of size between the femur and the humerus of the Scelidotherium, as exhibited in Pl. XX., without a conviction that it relates to other habits than those of climbing trees. The expanse of the sacrum, the evidence of the muscular masses employed in working the hind legs and tail, which is afforded by the capacity of the cavity lodging the part of the spinal marrow from which the nerves of those muscles were derived, both indicate the actions of the hind-legs and tail to have been more powerful and energetic than would be required for mere prehension: and the association of hinder extremities so remarkable for their bulk, with a long and powerful tail, forbids my yielding assent to the speculation set forth by M. Lund, as to the prehensile character of the tail of the Megalonyx.

*Astragalus*.—In the examination of this characteristic bone I have kept in view the question of the habits of the Megatherioid quadrupeds in general, and the especial affinities of the Scelidotherium, in illustration of which I shall notice at



the same time the peculiarities of the astragalus of the Sloth, Megatherium and Armadillo.\*

The upper articular surface of the astragalus of the Scelidotherium (Pl. XXVI. fig. 4.), presents, in its transverse contour, two convex pulleys, *a* and *b*, and an intermediate concavity, forming one continuous articular surface. The external or fibular trochlea (*a*) is strictly speaking convex only at its posterior part, the upper surface gradually narrowing to a ridge, as it advances forwards, from which, the inner and outer parts slope away at an angle of 35°.

The tibial† convexity (*b*) is more regular and less elevated, it has only half the antero-posterior extent of the outer pulley; its marginal contour forms an obtuse angle at the inner side.

In the Megatherium the upper articular surface of the astragalus is also divided into two trochleæ, of which the one on the fibular side (fig. 3, *a*), is of much greater relative size and extent than the tibial one (*b*), and is raised nearly four inches above the level of the latter, although in the oblique position in which the bone is naturally placed in the skeleton, the highest part of each convexity is on the same level. The fibular trochlea differs also from that in the Scelidotherium in being regularly convex in the transverse as well as the antero-posterior direction. The tibial convexity resembles that in the Scelidotherium, save in its smaller relative size; its internal margin likewise forms an angular projection below the internal malleolus.

The upper surface of the astragalus of the Mylodon, or Megalonyx (?) (Pl. XXVIII. fig. 5.),‡ differs from that in the Megatherium in having a narrower fibular trochlear ridge.

The astragalus of the Ai (*Bradypus tridactylus*) differs widely from that of either the Megathere, Mylodon (?) or Scelidotherium in having a conical cavity on the upper surface, in place of the fibular convexity, in which concavity the distal end of the fibula rotates like a pivot. This mechanism is closely related to the scansorial uses of the inwardly inflected foot of the Sloth.

If the astragalus of an Armadillo§ were placed side by side with that of the

\* *Dasyurus 6-cinctus*, L., is the species of which I have the astragalus separate, so as to be able to follow out the comparison.

† In distinguishing these trochleæ as fibular and tibial, it is to be understood that the terms relate only to aspects corresponding to the position of those bones, and not that the fibula is articulated to the whole of the trochlea so called: it probably rested only upon the outer facet in the Scelidotherium.

‡ This astragalus was found at Santa Fé, in Entre Rios, associated with the remains of the Mastodon and Toxodon; but from its size and form I entertain little doubt that it belonged to a Megatherioid quadruped as large as the Mylodon or Megalonyx. The brief allusion to the astragalus of the Megalonyx in M. Lund's Memoir does not afford the means of determining with certainty this point.

§ See the figures of this bone, given by Cuvier in Pl. x. and xi. Ossements Fossiles, vol. v. part i.

Megathere, it would be very difficult to determine the analogous parts, especially of the upper surface, unless guided by the intermediate structure presented by the Scelidotherium. The upper surface of this bone, in the Armadillo, is, however, divided into two transversely convex trochleæ, separated by a much wider transversely concave surface. The fibular trochlea resembles that of the Scelidotherium in having its upper and outer facets sloping away at an acute angle, but without meeting at a ridge anteriorly; this surface is not more raised above the tibial trochlea than in the Scelidotherium.

The inner trochlea differs from that of the Scelidotherium in having a greater relative antero-posterior extent, and in forming, in place of an uniform convex surface, a trochlea similar in structure to that on the outer side. The extent of rough surface on the upper part of the astragalus intervening between the articular surface for the bones of the leg, and that for the scaphoides is extremely small in the Megathere and Mylodon (?); it is relatively greater in the Scelidotherium; it is still more extensive in the Armadillo; but is the longest in the Sloth. The anterior extremity of the astragalus which is entirely occupied by the scaphoid articular surface is very peculiar in the Scelidotherium (Pl. XXVI. fig. 2.): it presents one convex and two concave facets, which, however, form part of one continuous articular surface: the convex facet forms the internal part of the surface, and presents a rhomboidal form with the long axis vertical. The concave facets (*c* and *d*) are extended transversely and placed one above the other; they are slightly concave in the transverse, and nearly flat in the vertical directions.

In the Megatherium (fig. 1.) the scaphoid surface of the astragalus is divided only into one concave and one convex portion, both continuous with each other: the concave facet (*c*) corresponds with the upper concavity in the Scelidotherium, but is a pretty uniform subcircular depression, fourteen lines in depth: the convex facet, *d*, is continued across the whole breadth of the under part of the scaphoid surface and corresponds with both the inner convex, and lower concave surfaces of the scaphoid articulation in the Scelidotherium.

In the Mylodon (?) (Pl. XXVIII. fig. 3.), the articular facet, corresponding with that marked (*c*) in the astragali of the Megathere and Scelidotherium, is simply flattened, instead of being concave; the rest of the scaphoid surface corresponds with that in the Megatherium.

In the Armadillo the scaphoid articular surface is undivided and wholly convex: in this part of the astragalus, therefore, we find the Scelidotherium deviating from the Armadillo further than does the Megathere; while the Mylodon or Megalonyx (?) most resembles the Armadillo in the configuration of this part of the astragalus.

If we compare the outer surfaces of the astragalus in these quadrupeds,



we shall find, however, that the Scelidothera and Armadillo closely agree: the outer facet of the fibular trochlea, above described, is continued in the Scelidothera (Pl. XXVIII. fig. 2.), upon the fibular side of the astragalus reaching nearly half-way down the posterior part, and down nearly the whole of its anterior.

In the Armadillo, it extends over the whole of the anterior part of the outer side of the astragalus. In both animals the lower boundary of this articular surface describes a strong sigmoid curve.

In the Megatherium (Pl. XXVIII. fig. 1), the corresponding surface for the fibular malleolus on the outer side of the astragalus is formed by a comparatively very small semicircular flattened facet, which by its roughness indicates that the end of the fibula was attached to it by ligamentous substance, and that the synovial bag was not continued upon that surface as in the Scelidothera and Armadillo.

In the Mylodon (?) (Pl. XXVIII. fig. 4), even this rough facet is wanting and the fibular trochlea is bounded by the angle which divides the upper from the outer surface of the astragalus.

Turning now our attention to the under surface of the astragalus, we observe that it presents in the Scelidothera (Pl. XXVI. fig. 6), an irregular quadrate form, having the outer side occupied by an elongated sub-ovate articular facet, *e*, for the calcaneum, bounded externally by a sharp edge, with its long axis and its greatest concavity in the antero-posterior direction, and slightly convex from side to side: a second calcaneal articular surface (*f*) is situated at the inner and anterior angle; it is oblong and nearly flat; is continuous with the inferior concave facet of the scaphoid articulation, but is divided from the convex facet by a groove: the two calcaneal articulations are separated by a deep and rough depression, traversing the under surface of the astragalus diagonally, and increasing in breadth towards the posterior and internal angle. The inner side of the astragalus presents a convex protuberance.

The correspondence between the astragalus of the Scelidothera and Megathera is best seen at the under surface of the bone: in both the two calcaneal articulations are separated by the diagonal depression, and the internal and anterior surface is continuous with the scaphoid articulation. In the Megathera, however, in consequence of the absence of the inferior concavity which characterizes the Scelidothera, the anterior calcaneal facet (*f*) appears as a more direct backward continuation of the scaphoidal surface; but they are divided by a more marked angle than is represented in the figure (fig. 5, Pl. XXVI.). The posterior and outer calcaneal surface in the Megathera (*e*) is broader in proportion to its length, continued further upwards upon the outward surface, is consequently more convex in the transverse direction, and is not bounded externally by so sharp and prominent a ridge as in the

Scelidothera. The protuberance from the inner surface of the astragalus is more compressed laterally in the Megathera than in the Scelidothera. The correspondence between the astragali of the Mylodon (?) (Pl. XXVIII. fig. 6) and Megathera in the conformation of the under surface is so close, that the few differences which exist will be sufficiently appreciated by an inspection of the figures.

In the Armadillo the astragalus, in consequence of the greater production of its anterior part, presents more of an angular than a quadrate figure; and the scaphoid articular surface, being proportionally carried forwards, is altogether separated from the anterior calcaneal surface. The posterior and inner calcaneal surface resembles that in the Scelidothera, but is less inclined upwards; and is continuous with the posterior part of the tibial articular surface.

Thus the astragalus in the structure of its two most important articulations, viz. that which receives the superincumbent weight from the leg, and that which transmits it to the heel, presents a closer correspondence in the Scelidothera with that of the Dasypus, than with that of the Megathera or Mylodon.

The ungual phalanx of the Scelidothera before alluded to, is represented of the natural size in Pl. XXVII. The side-view, fig. 3. shows the position of the articular surface on the proximal end, sloping obliquely towards the under surface, and overtopped by an obtuse protuberance, calculated to impede any upward retraction of the claw: the present joint, in fact, illustrates in every particular the argument by which Cuvier established the true affinities of the allied extinct genus *Megalonyx*.\*

The present phalanx is, however, less compressed, and less incurved than those of the *Megalonyx*, which have been hitherto described; but it more resembles in these proportions one of the smaller, and presumed hinder, ungual phalanges of the Megatherium. The upper and lateral parts of the bone are rounded, and it gradually tapers to the apex, which is broken off. The osseous sheath for the claw is developed only at the under part of the bone: it presents the form of a thick flat plate of bone, with the margin very regularly and obliquely bevelled off, and having a vertical process of bone attached lengthwise to the middle of its under surface. This process must have served for the insertion of a very powerful flexor tendon. The figures of this bone preclude the necessity of any further verbal description.

M. Lund lays most stress upon the argument founded on the inward inflection of the sole of the foot in the *Megalonyx*, and appeals with greatest confidence to this structure in support of his hypothesis of the scansorial habits of that extinct *Edental*.†

\* *Ossemens Fossiles*, vol. v. part i. p. 163.

† For the translation of the following passage, and of others alluded to in the present work, from the original Danish Memoir of M. Lund, loc. cit., I am much indebted to the Rev. W. Bilton, M.A. &c. &c. :—



It is quite true that the *Quadrumana* derive advantage from this position of the foot in climbing trees, and that it is carried to excess in the Sloths, which can only apply the outer edge of the foot to the ground. But we may ask, was the inversion of the sole of the foot actually carried to such an extent in the *Megalonyx*? And, admitting its existence in an inferior degree, is it then conclusive as to the scansorial habits of that species?

M. Lund expressly states that it is produced by a different structure and arrangement of the tarsal bones, from that which exists in the Sloth, but he does not specify the nature of this difference.

If the astragalus, which I have referred with doubt to the *Megalonyx*, do not actually belong to that genus, it is evidently part of a very closely allied species. Now this astragalus, as we have seen, resembles most closely that of the *Megatherium*; and since we may infer that the calcaneum, scaphoides, and cuboides had a like correspondence, the inclination of the sole of the foot inwards must have been very slight, as I have determined from examination of the structure and co-adaptation of those bones in the incomplete skeleton of the *Megatherium* in the London College of Surgeons. Such an inclination of the foot may be conceived to have facilitated the bending of the long claws upon the sole, during the ordinary progressive movements of the animal, but it is quite insufficient to justify the conclusion, that it related to an application of the hind feet for the purposes of climbing.

It is not without interest again to call to mind the deviation of the structure

"Thus in every point of comparison we have instituted between the organization of burrowers and climbers; we have seen that the *Megalonyx* constantly differs from the former and resembles the latter; but the point to which I last alluded (the obliquity of foot), I consider to be quite decisive.

"There is one other point in its organization, which is not quite without weight in reference to our present inquiry,—I mean its unusually powerful tail. Now, it is certainly true that many animals which are not climbers have a powerful tail, as e.g. Armadillos, while the others that climb well, have none, as Sloths and Apes. But when we find a remarkably powerful tail attached to an animal that according to all probability was a climber, we are led to infer that this organ must have served for that purpose: in other words, that the *Megalonyx* was furnished with a prehensile tail.

"How far the *Megatherium* is to be considered in the same light as the *Megalonyx* cannot be decided without an accurate and scientific examination of its skeleton at Madrid. Pander and D'Alton do not mention any distortion of the hind-foot, neither does their figure exhibit any. It is nevertheless quite possible that such may exist, but that it is disguised by the faulty manner in which the skeleton is put up. It strikes me as little probable that two animals which agree so well in the principal particulars of their organization should differ so much in one of the most important. The *Megatherium* has been proved by later discoveries to possess the same powerful tail as the *Megalonyx*, and as it corresponds also with the latter entirely in the conformation of its extremities, the same difficulties present themselves against the supposition of its having been a burrower. But if the *Megatherium* was really a climber, it must have had still more occasion (on account of its greater size), for that peculiar arrangement of the hind-feet which we have described in the *Megalonyx*."

of the astragalus of the *Scelidothera* from the *Megatherioid* to the *Dasypodoid* type of structure. For if the *Megatherioid* type of structure had really been one suitable to the exigencies of climbing quadrupeds, it might have been expected to have exhibited the scansorial modifications more decidedly, as the species diminished in stature; but as regards the instructive bone of the hind-foot, the modifications of which we have just been considering, this is by no means the case.

#### DESCRIPTION OF A MUTILATED LOWER JAW OF THE

#### MEGALONYX JEFFERSONII.

In the preceding section an astragalus was described, which was regarded as belonging possibly to the same Edentate species as the jaw figured and described, p. 69, Pl. XVIII. and XIX., under the name of *Myiodon Darwinii*; but the same correspondence,—that of relative size,—renders it equally possible that this astragalus may belong to the species of *Megalonyx* to which the lower jaw now under consideration appertains. There could be no doubt, from its structure, that it was the astragalus of a gigantic species of the order *Bruta*, and of the *Megatherioid* family, and more nearly allied to the *Megathera* than is the *Scelidothera*, but sufficiently distinct from both.

The lower jaw, figured in Pl. XXIX., is the only fossil brought home by Mr. Darwin that could be confidently referred to the genus *Megalonyx*; but the form of the tooth in place on the right side of the jaw fully justifies this determination. The jaw itself is deeply and firmly imbedded in the matrix, so that only the upper or alveolar border is visible. The coronoid and condyloid processes are broken away, and the texture of the remaining part of the jaw was too friable, and adhered too firmly to the surrounding matrix to admit of more of its form being ascertained than is figured.

There were four molars on each side of this jaw; the large oblique perforation near the fractured symphysis is the anterior extremity of the wide dental canal. The forms of the alveoli are best preserved in the right ramus: the first is the smallest, and seems to have contained a tooth, of which the transverse section must have been simply elliptical: the second tooth is likewise laterally compressed, but the transverse section is ovate, the great end being turned forwards: the third socket presents a corresponding form, but a larger size: the fourth socket is too much mutilated to allow of a correct opinion being formed as to the shape of the tooth which it once contained. The natural size of the tooth



*in situ*, and of the adjoining socket, is given in Pl. XXIX., fig. 2. The difference of form which the jaw of the *Megalonyx* presents, as compared with that of the *Mylodon*, especially in the greater recedence of the two horizontal rami from each other, will be appreciated by comparing Pl. XVIII. with Pl. XXIX.

DESCRIPTION OF A FRAGMENT OF THE SKULL AND OF THE TEETH OF THE  
MEGATHERIUM CUVIERI.

NOTWITHSTANDING the full, accurate, and elaborate accounts of the skeleton of the *Megatherium* given by Brû,\* Cuvier,† Pander and D'Alton,‡ and Mr. Clift,§ the fragments of this most gigantic of quadrupeds brought home by Mr. Darwin, possess much interest, and have added, what could hardly have been anticipated, important information as to the dental system, whereby an error in the generic character of the *Megatherium* has been corrected.

The fragments here alluded to are portions of the skull of three full-grown *Megatheres*: the most perfect part of which affords a view of the posterior, and of part of the basal surface, which regions of the cranium have not hitherto been elsewhere figured or described, (Pl. XXX.)

The plane of the occipital foramen forms with that of the base of the skull an angle of  $140^\circ$ , the plane of the posterior surface of the skull forms with the basal plane an angle of  $68^\circ$ . The occipital condyles are therefore terminal, or form the most posterior parts of the cranium. The extent of their convex curvature in the antero-posterior direction, which equals that of a semicircle, indicates that the *Megatherium* possessed considerable freedom and extent of motion of the head. The condyles are not extended in the lateral direction so far as in the *Toxodon*; their axis is more oblique than in the *Glossotherium*, and their internal surface is more parallel with the axis of the skull, the foramen magnum not presenting that infundibuliform expansion which is so characteristic of the *Glossotherium*. The occipital condyles resemble most in form and position those of the *Scelidotherium*; but in the angle of the occipital plane the *Megatherium* is intermediate between the *Scelidotherium* and *Glossotherium*. The ex-occipitals terminate laterally and inferiorly, each in a short, but strong obtuse process. The posterior plane of the skull is traversed by a strong arched intermuscular crest, which

\* Descripcion del Esqueleto de un quadrupedo muy corpulento y raro, que se conserva en el Real Gabinete de Historia Natural de Madrid. Folio, Madrid, 1796.

† Ossements Fossiles, tom. v. pt. i. p. 179.

‡ Das Riesen Faultier, *Bradypus giganteus*, von Dr. Chr. Pander und Dr. E. D'Alton." Folio, Bonn, 1821.

§ Transactions of the Geological Society, 1835, p. 438.

forms the upper boundary of a pretty deep fossa, which is divided by a median vertical ridge, extending downwards to within an inch of the upper margin of the foramen magnum. A second strong obtuse transversely arched ridge curves over the first, and forms the upper boundary of the posterior or occipital region of the skull: the interspace between the two transverse ridges is very irregular, and indicates the firm implantation of powerful nuchal muscles or ligaments, (Pl. XXX. fig. 1.)

In the configuration and angle of the occipital plane the *Megatherium* indicates the same general correspondence with the Edentate type, which has been pointed out in the descriptions of the crania of the *Glossotherium* and *Scelidotherium*: and the resemblance to the *Scelidotherium* is not less striking in the small proportional size of the cranium in this quadruped, which surpasses the rest of its class in so great a degree in the colossal proportions of its hinder parts.

Having detected in the base of the skull of the *Scelidotherium* an articular semicircular pit for the head of the styloglossal bone, similar to, but relatively smaller than, that remarkable one in the skull of the *Glossotherium*, it became a matter of interest to determine whether this structure, which does not exist in any of the existing Edentals, should likewise be present in the gigantic type of the *Megatherioid* family. The result of a careful removal of the matrix from the basal region of one of the cranial fragments of the *Megatherium* was the detection of this articular cavity, in each temporal bone in the same relative position as in the *Glossotherium* and *Scelidotherium*. The styloid articular cavity is relatively smaller, and shallower, than in the *Glossotherium*, its proportions being much the same as those of the *Scelidotherium*. The cranial or posterior extremity of the stylo-hyoid bone in the *Scelidotherium* is bent upwards at an obtuse angle (Pl. XXI.), and terminates in an articular ball which rotates in this cavity. The size of this bone, and its mode of articulation, indicates great power and muscularity of tongue in the *Megatherioids*, and calls to mind the importance of that organ in the Giraffe, which subsists on the same kind of food as that which I have supposed to have supported the *Megatherioids*, although the general organization of these animals and the mode in which the foliage was brought within reach of the tongue are as opposite as can well be imagined.

The anterior condyloid foramen presents scarcely one half the absolute size of that of the *Glossotherium*, whence we may infer a correspondingly inferior development of the tongue in the *Megatherium*. The fractured parietes of the cranial cavity of the *Megatherium* every where exhibit evidences of the great extent of the air-cells or sinuses continued from the nasal cavity: on the basilar aspect of the cranium they extend as far back as the jugular foramina: the whole of the basi-sphenoid being thus excavated, and permeable



to air, derived from the sphenoid sinuses, (Pl. XXX. fig. 2.) The vertical diameter of the cranial cavity is four inches, eight lines; its transverse diameter, which is greatest in the posterior third part of the cavity, corresponding with the posterior part of the cerebrum is six inches: from the indications afforded by the remains of the cranial cavity in Mr. Darwin's specimens, I conclude that the brain of the Megatherium was more depressed, and upon the whole, smaller by nearly one-half than that of the Elephant; but with the cerebellum relatively larger, and situated more posteriorly with relation to the cerebral hemispheres: whence it may be concluded that the Megatherium was a creature of less intelligence, and with the command of fewer resources, or a less varied instinct than the Elephant.

It has been usual to characterize the Megatherium, in conformity with the concurrent descriptions of Bru, Cuvier, and D'Alton, by the dental formula of *molares*  $\frac{4}{4}$ , i. e. by the presence of four grinding teeth on each side of the upper, as of the lower jaw. It was the agreement of the excellent authorities above cited in this statement, which induced Mr. Clift and myself to regard a single detached tooth, which formed part of the valuable collection of remains of the Megatherium deposited in the Hunterian Museum by Sir Woodbine Parish, as being, from its comparatively small size, the tooth of either a younger individual or of a smaller species of Megatherium. Upon clearing away the matrix from the palatal and alveolar surface of one of the cranial fragments of the Megatherium in Mr. Darwin's collection, I was gratified by the detection of the crown of a fifth molar, corresponding in size and form with the detached tooth, above alluded to: its small size, and its position have doubtless occasioned its being over-looked in the cranium of the great skeleton at Madrid.

The anterior molar of the upper jaw presents a nearly semicircular transverse section, with the angles rounded off; the three succeeding teeth are four-sided, with the transverse somewhat exceeding the antero-posterior diameter: they are rather longer and larger than the first: the last molar is likewise four-sided, but presents a sudden diminution of diameter, and is relatively broader. The following are the respective dimensions of the upper maxillary teeth.

	First Molar.		Second Molar.		Third Molar.		Fourth Molar.		Fifth Molar.	
	In.	Lines.	In.	Lines.	In.	Lines.	In.	Lines.	In.	Lines.
Length . . . . .	8	6	9	4	9	4	8	7	5	2
Transverse diameter . . . . .	1	9	2	4	2	3	2	0	1	4
Antero-posterior diameter . . . . .	1	5	2	0	2	0	1	11	0	10

Besides the differences in size, the upper molars vary as to their curvature: this difference is exhibited in the vertical section of these teeth figured in Pl. XXXI. The convexity of the curve of the first, second and third molars is directed

forwards; the fourth is straight, its anterior surface only describing a slight convexity in the vertical direction; the fifth tooth is curved, but in a contrary direction to the others; and the bases of the five molars thus present a general convergence towards a point a little way behind the middle of the series.

The next peculiarity to be noticed in these remarkable teeth is the great length of the pulp-cavity (*d*), the apex of which is parallel with the alveolar margin of the jaw: a transverse fissure is continued from this apex to the middle concavity of the working surface of the tooth, which is thus divided into two parts. Each of these parts consists of three distinct substances,—a central part analogous to the body or bone of the tooth or 'dentine,' a peripheral and nearly equally thick layer of *cæmentum*, and an intermediate thinner stratum of a denser substance, which is described in Mr. Clift's memoir on the Megatherium as 'enamel,' and to which substance in the compound teeth of the Elephant, it is analogous both in its relative situation, and relative density to the other constituents.

Microscopic examinations of thin and transparent slices of the tooth of the Megatherium prove, however, that the dense layer separating the internal substance from the *cæmentum* is not enamel, but presents the same structure as the hard 'dentine' or ivory of the generality of Mammalian teeth; and corresponds with the thin cylinder of hard 'dentine' in the tooth of the Sloth. No species of the Order *Bruta* has true enamel entering into the composition of its teeth; but the modifications of structure which the teeth present in the different genera of this order are considerable, and their complexity is not less than that of the enamelled teeth of the Herbivorous Pachyderms and Ruminantia, in consequence of the introduction of a dental substance into their composition corresponding in structure with that of the teeth of the *Myliobates*, *Psammodus*, and other cartilaginous fishes.

The microscopic investigation of the structure of the teeth of the Megatherium was undertaken chiefly with the view of comparing this structure with that of the teeth of the Sloth and Armadillo, and of thus obtaining an insight into the food, and an additional test of the real nature of the disputed affinities of the Megatherium. The central part of the tooth (*c*. Pl. XXXI.) consists of a coarse ivory, like the corresponding part of the tooth of the Sloth. It is traversed throughout by medullary canals  $\frac{1}{150}$ th of an inch in diameter, which are continued from the pulp-cavity, and proceed, at an angle of  $50^\circ$ , to the plane of the dense ivory, parallel to each other, with a slightly undulating course, having regular interspaces, equal to one and a half diameters of their own area, and generally anastomosing in pairs by a loop of which the convexity is turned towards the origin of the tubes of the fine dentine, as if each pair so joined consisted of a continuous reflected canal, (*c*. fig. 1, Pl. XXXII.) The loops are gene-



rally formed close to the fine dentine. In a few situations I have observed one of the medullary canals continued across the fine dentine, and anastomosing with the corresponding canals of the cæmentum. The interspaces of the medullary canals of the coarse dentine are principally occupied by calcigerous tubes which have an irregular course, anastomose reticularly, and terminate in very fine cells. The more regular and parallel calcigerous tubes, which constitute the thin layer of hard dentine, are given off from the convexity of the terminal loops of the medullary canals. The course of these tubes (*b. fig. 1, Pl. XXXII.*) is rather more transversely to the axis of the tooth than the medullary canals from which they are continued. They run parallel to each other, but with minute undulations throughout their course, in which they are separated by interspaces equal to one and a half their own diameter. As they approach the cæmentum they divide and sub-divide, and grow more wavy and irregular: their terminal branches take on a bent direction, and form anastomoses, dilate into small cells, and many are seen to become continuous with the radiating fibres or tubes of the cells or corpuscles of the contiguous cæmentum. This substance enters largely into the constitution of the compound tooth of the Megatherium: it is characterized, like the cæmentum of the Elephant's grinder, by the presence of numerous radiated cells, or purkian corpuscles, scattered throughout its substance, but may be distinguished by wide medullary canals which traverse it in a direction parallel with each other, and forming a slight angle with the transverse axis of the tooth. These canals are wider than those of the central coarse dentine, their diameter being  $\frac{1}{12}$  of an inch; they are separated by interspaces equal to from four to six of their own diameters, divide a few times dichotomously in their course, and finally anastomose in loops, the convexity of which is directed towards, and in most cases is in close contiguity with, the layer of dense dentine.

Fine calcigerous tubes are every where given off at right angles from the medullary canals of the cæmentum, which form a rich reticulation in their interspaces, and a direct continuation between the loops of the medullary canals and the calcigerous tubes of the dense dentine. The cæmentum differs from the coarse dentine in the larger size and wider interspaces of its medullary canals, and by the presence of the bone-corpuscles in their interspaces; but they are brought into organic communication with each other, not only by means of the tubes of the dense dentine, but by occasional continuity of the medullary canals across that substance. The tooth of the Megatherium thus offers an unequivocal example of a course of nutriment from the dentine to the cæmentum, and reciprocally. Retzius observes with respect to the human tooth, that "the fine tubes of the cæmentum enter into immediate communications with the cells and tubes of the dentine (zahnknochen), so that this part can obtain from without the requi-

site humours after the central pulp has almost ceased to exist." In the Megatherium, however, those anastomoses have not to perform a vicarious office, since the pulp maintains its full size and functional activity during the whole period of the animal's existence. It relates to the higher organized condition, and greater degree of vitality of the entire grinder in that extinct species.

The conical cavities (*d. Pl. XXXI.*) attest the size and form of the persistent pulp; the diameter of its base is equal to the part of the crown of the tooth which is formed by the coarse and fine dentine. From the gradual thinning off, and final disappearance of these substances as they reach the base of the tooth, I conclude that they were both formed at the expense of the pulp. The fine tubes and cells must have been excavated in its peripheral layer for the reception of the hardening salts of the dense dentine, and the rest converted into the parallel series of medullary canals with their respective systems of calcigerous tubes, in a manner closely analogous to the development of the entire tooth of the *Orycteropus*. The coarser dentine of the tooth of the Megatherium differs, in fact, from the entire tooth of the *Orycteropus*, only in that the parallel medullary canals and their radiating calcigerous tubes are not separated from the contiguous canals by a distinct layer of cæmentum, and that the medullary canals anastomose at their peripheral extremities. The wide spaces, (*e. Pl. XXXI.*) indicate the thickness of the dental capsule by the ossification of which the exterior stratum of cement was formed. It was not until I knew the true structure of the tooth of the Megatherium, that I could comprehend the mode of its formation. The parallel layers of enamel in the Elephant's grinder are formed, as is well known, by membranous plates passing from the coronal end of the closed capsule towards the base of the tooth; but a certain extent of enamel can only thus be formed, and when the crown of the grinder has once protruded, and come into use, the enamel cannot be added to. The modification of the structure of the tooth of the Megatherium readily permits the uninterrupted and continuous formation of the dense substance which is analogous to the enamel of the Elephant's grinder.

With respect to the question of the respective affinities of the Megatherium to the Bradypodoid or Dasypodoid families, the result of this examination of the teeth speaks strongly for its closer relationship with the former group: the *Megalonyx*, *Myodon*, and *Scelidotherium*, in like manner correspond in the structure of their teeth with the Sloth, and differ from the Armadillo.

If from a similarity of dental structure we may predicate a similarity of food, it may reasonably be conjectured that the leaves and soft succulent sprouts of trees may have been the staple diet of the Megatherioid quadrupeds, as of the existing Sloths. Their enormous claws, I conclude, from the fossorial character of the powerful mechanism by which they were worked, to have been employed,



not, as in the Sloths, to carry the animal to the food, but to bring the food within the reach of the animal, by uprooting the trees on which it grew.

In the remains of the Megatherium we have evidence of the frame-work of a quadruped equal to the task of undermining and hawling down the largest members of a tropical forest. In the latter operation it is obvious that the immediate application of the anterior extremities to the trunk of the tree would demand a corresponding fulcrum, to be effectual, and it is the necessity for an adequate basis of support and resistance to such an application of the fore-extremities which gives the explanation to the anomalous development of the pelvis, tail, and hinder extremities in the Megatherioid quadrupeds. No wonder, therefore, that their type of structure is so peculiar; for where shall we now find quadrupeds equal, like them, to the habitual task of uprooting trees for food?

DESCRIPTION OF FRAGMENTS OF BONES, AND OF OSSEOUS TESSELATED DERMAL COVERING OF LARGE EDENTATA.

It is now determined that there once existed in South America, besides the Megatherium, the Megalonyx, and the allied genera described in the preceding pages of the present work, gigantic species of the order *Bruta* belonging to the Armadillo family, and defended, like the small existing representatives of that family, by a tessellated bony dermal covering. The largest known species of these extinct *Dasypodidæ* is the *Glyptodon clavipes*, of which the armour and parts of the skeleton have been described by MM. Weiss and D'Alton in the Berlin Transactions for 1827 and 1834: and the generic and specific characters and name, with an account of the dental system, and bones of the extremities, were recorded in the Geological Proceedings for March 1839. It would seem that parts of the same, or a nearly allied gigantic species were described in the same year by M. Lund; under the name of *Hoplophorus*. Of the valuable and interesting discoveries of this able Naturalist I regret that I was not aware until the appearance of a notice of them in the Comptes Rendus for April, 1839.\* Amongst the fragments of bony tessellated armour in Mr. Darwin's collection are a few pieces which were found by him, associated with remains of *Toxodon* and *Glossotherium* near the Rio Negro in Banda Oriental.† These fragments, if we may judge from their thickness, must have belonged to an animal at least as

\* An excellent translation of the description of the Brazilian fossils found by M. Lund, is published in the Annals of Natural History, July and August, 1839.

† At the distance of a few leagues from the locality here mentioned, other fragments were found by Mr. Darwin; also near Santa Fé, in Entre Rios; also on the shores of the Laguna, near the Guardia del Monte, South of Buenos Ayres; also, according to the Jesuit Falkner, on the banks of the Tercero.

large as the *Glyptodon clavipes*; but the pattern differs in the greater equality of size of the component tesserae. The thickness of the largest fragment is one inch and a half, the tesserae vary in diameter from one inch to half an inch, and are separated by grooves about two lines in depth, and two in diameter. The pattern formed by the anastomosis of these grooves is an irregular net-work; the contour of the tesserae is either unevenly subcircular, hexagonal, pentagonal, or even four-sided; with the sides more or less unequal. In those portions of this armour, where one of the tesserae exceeds the contiguous ones in size, the imagination may readily conceive it to be the centre of a rosette, around which the smaller ones arrange themselves, but there is no regular system of rosettes, as in the portions of the dermal armour of the *Glyptodon* figured by Weiss, and those brought to England by Sir Woodbine Parish, in which the central piece is double the size of the marginal ones.

The portions of the tessellated bony dermal covering of a *Dasypodoid* quadruped, figured in Pl. XXXII. figs. 5 and 4, of the natural size, were discovered folded round the middle and ungual phalanges, figs. 2 and 3, at Punta Alta, in Bahia Blanca, in an earthy bed interstratified with the conglomerate containing the remains of the fossil Edentals.

In one of these fragments, measuring six inches long by five broad, the tesserae are arranged in rosettes, and so closely correspond in size and pattern with the bony armour described by M. Lund, as characterizing his species, *Hoplophorus euphractus*, that I feel no hesitation in referring them to that animal. One of the pattern rosettes is figured at fig. 4, together with the thickness of the armour at this part, and the coarse tubulo-cellular structure of the bone. Another portion of dermal armour from the same locality, gives the pattern shown in fig. 5, formed by square or pentagonal tesserae, arranged in transverse rows; it is certain that this portion of armour belonged to the same animal as the preceding piece; and probably that it constituted part of the transverse dorsal bands of the *Hoplophorus*.

The middle and ungual phalanx, as well as the portions of armour, are given of the natural size, in Pl. XXXII. The upper and outer surface of the phalanx, is shown in fig. 2. It is smooth and flat; joins the inner surface by a sharp edge, which runs along the upper and inner side of the bone; and passes by a gradual convexity to the under surface; the ridge corresponding with the base of the claw, is feebly developed at the under and lateral parts of the base of the claw. Below the double trochlear joint for the middle phalanx, there are two articular surfaces for two large sesamoid bones.

The middle phalanx corresponds in its small antero-posterior diameter and wedge-shape, with that of the great *Glyptodon*: but the terminal phalanx is longer and deeper, in proportion to its breadth.



Among the collection of fossils from Punta Alta, in Bahia Blanca, there is an interesting fragment of the head of a gigantic animal of the Edentate order, including the glenoid cavity, and part of the zygomatic process of the left side. The articular surface for the lower jaw, exhibits, in its flatness, extent, and the absence of a posterior ridge, the well-marked characteristics of this part of the Edental structure. It measures two inches four lines in the transverse, and two inches two lines in the antero-posterior diameter. The commencement of the zygomatic process presents a vertical diameter of two inches, and a transverse diameter of eight lines at the thickest part. It is slightly concave at its lower border, and convex above. The small portion of the cranial parietes, which is preserved, exhibits the cellular structure consequent upon the great extension and development of the nasal air-sinuses: this condition of the cranial parietes, has already been noticed in the description of the more perfect skulls of the large extinct Edentata.

NOTICE OF FRAGMENTS OF MOLAR TEETH OF A  
MASTODON.

Of the remains of this gigantic extinct Pachyderm, observed by Mr. Darwin at Santa Fé, in Entre Rios, and on the banks of the Tercero, the fragments of the teeth and portions of the skeleton which reached England, are not sufficient to lead to a determination of the species; but sufficiently prove it to have been nearly allied, if not identical, with the *Mastodon angustidens* of Cuvier, and unquestionably distinct from the *Mastodon giganteum* of the United States.

NOTICE OF THE REMAINS OF A SPECIES OF  
EQUUS.

*Found associated with the extinct Edentals and Toxodon at Punta Alta, in Bahia Blanca, and with the Mastodon and Toxodon at Santa Fé, in Entre Rios.*

The first of these remains is a superior molar tooth of the right side; it was embedded in the quartz shingle, formed of pebbles strongly cemented together with calcareous matter, which adhered as closely to the tooth in question, as the corresponding matrix did to the associated fossil remains. The tooth was as completely fossilized as the remains of the Mylodon, Megatherium, and Scelidotherium; and was so far decomposed, that in the attempt to detach the adherent matrix, it

became partially resolved into its component curved lamellæ. Every point of comparison that could be established proved it to differ from the tooth of the common *Equus Caballus* only in a slight inferiority of size.

The second evidence of the co-existence of the horse with the extinct Mammals of the tertiary epoch of South America reposes on a more perfect tooth, likewise of the upper jaw, from the red argillaceous earth of the Pampas at Bajada de Santa Fé, in the Province of Entre Rios.\*

This tooth is figured at Pl. XXXII. fig. 13 and 14, from which the anatomist can judge of its close correspondence with a middle molar of the left side of the upper jaw.

This tooth agreed so closely in colour and condition with the remains of the Mastodon and Toxodon, from the same locality, that I have no doubt respecting the contemporaneous existence of the individual horse, of which it once formed part.

This evidence of the former existence of a genus, which, as regards South America, had become extinct, and has a second time been introduced into that Continent, is not one of the least interesting fruits of Mr. Darwin's palæontological discoveries.

DESCRIPTION OF REMAINS OF RODENTIA, INCLUDING THE JAWS AND TEETH OF  
AN EXTINCT SPECIES OF

CTENOMYS.

The fragment of the upper jaw, figured in Pl. XXXII. fig. 6, exhibits the first and second molar *in situ*, and the socket of the third and fourth molar, of a Rodent, which by the form and number of the upper maxillary teeth is referable to the genus *Ctenomys*. The molars are a little larger, the longitudinal groove on their external surface is somewhat deeper, and the last molar is relatively wider than in the existing subterranean species,—the Tucutucu (*Ctenomys Brasiliensis*, Bl.), of whose habits so interesting an account is given in the description of the Mammalia of the present Collection (No. IV. p. 79). The form of the grinding surface of the first and second upper molar is shown below the fig. 6, and three views of the second grinder are given at figs. 7, 8, and 9. The fragment of the lower jaw of the same fossil Rodent is figured at fig. 10 and 11. The long anterior incisor is relatively narrower than in the *Ctenomys Brasiliensis*. I have not had the means of comparing this fossil with the *Ctenomys Magellanicus*; but since it is probable that the *Ct. Magellanicus* may not be specifically different from the *Ct.*

\* Mr. Darwin has more particularly described the circumstances of the embedment of this tooth in his Journal of Researches, p. 149, during the Voyage of the Beagle.



*Brasiliensis*, it may be concluded that the present fossil is equally distinct from both.

The portion of the right hind-foot of the Rodent figured at fig. 12, includes the calcaneum, astragalus, cuboides, external and middle cuneiform bones, and the metatarsals and proximal phalanges of the toes corresponding with the three middle toes of five-toed quadrupeds. The metatarsals are chiefly remarkable for the well-developed double-trochlear articular surface, and intermediate ridge. These remains, as well as the jaws and teeth of the *Ctenomys*, were discovered at Monte Hermoso in Bahia Blanca.

In the same reddish earthy stratum of that locality, Mr. Darwin discovered the decomposed molar of a Rodent, equalling in size, and closely resembling in the disposition of its oblique component laminae, the hinder molar of the *Capybara* (*Hydrochaerus*). The fossil differs, however, in the greater relative breadth of the component laminae.

I have, lastly, to notice the head of a femur, and some fragments of pelvic bones from the same formation which bear the same proportion to the tooth above alluded to, as subsists between the teeth and bones of the *Capybara*, and which are sufficient to prove that there once has existed in South America a species of the family *Caviidae*, as large as the present *Capybara*, but now apparently extinct.

This fact, together with the greater part of those which have been recorded in the foregoing pages of the present work, establishes the correspondence, in regard to the characteristic type, which exists between the present and extinct animals of the South American Continent: we have abundant evidence likewise of the greater number of generic and specific modifications of these fundamental types which the animals of a former epoch exhibited, and also of the vastly superior size which some of the species attained.

At the same time it has been shewn that some of the present laws of the geographical distribution of animals would not have been applicable to South America, at the period when the *Megatherioids*, *Toxodon*, and *Macrauchenia* existed: since the Horse, and according to M. Lund, the Antelope and the Hyæna, were then associated with those more strictly South American forms. The Horse, which, as regards the American continent, had once become extinct, has again been introduced, and now ranges in countless troops over the pampas and savannahs of the new world. If the small Opossums of South America had been in like manner imported into Europe, and were now established like the Squirrels and Dormice in the forests of France, an analogous case would exist to that of the Horse in South America, as the fossil *Didelphys* of Montmartre proves.

With respect to the geological contemporaneity of the fossils collected by him, Mr. Darwin subjoins the following observations:—

“The remains of the following animals were embedded together at Punta Alta in Bahia Blanca:—The *Megatherium Cuvierii*, *Megalonyx Jeffersonii*, *Myiodon Darwinii*, *Scelidotherium leptcephalum*, *Toxodon Platensis* (?) a Horse and a small Dasypodoid quadruped, mentioned p. 107; at St. Fé in Entre Rios, a Horse, a Mastodon, *Toxodon Platensis*, and some large animal with a tessellated osseous dermal covering; on the banks of the Tercero the Mastodon, *Toxodon*, and, according to the Jesuit Falkner, some animal with the same kind of covering; near the Rio Negro in Banda Oriental, the *Toxodon Platensis*, *Glossotherium*, and some animal with the same kind of covering. To these two latter animals the *Glyptodon clavipes*, described by Mr. Owen in the Geological Transactions, may, from the locality where it was discovered, and from the similarity of the deposit which covers the greater part of Banda Oriental, almost certainly be added, as having been contemporaneous. From nearly the same reasons, it is probable that the Rodents found at Monte Hermoso in Bahia Blanca, co-existed with the several gigantic mammifers from Punta Alta. I have, also, shown in the Introduction, that the *Macrauchenia Patachonica*, must have been coeval, or nearly so, with the last mentioned animals. Although we have no evidence of the geological age of the deposits in some of the localities just specified, yet from the presence of the same fossil mammifers in others, of the age of which we have fair means of judging, (in relation to the usual standard of comparison, of the amount of change in the specific forms of the invertebrate inhabitants of the sea,) we may safely infer that *most* of the animals described in this volume, and likewise the *Glyptodon*, were strictly contemporaneous, and that *all* lived at about the same very recent period in the earth's history. Moreover, as some of the fossil animals, discovered in such extraordinary numbers by M. Lund in the caves of Brazil, are identical or closely related with some of those, which lately lived together in La Plata and Patagonia, a certain degree of light is thus thrown on the antiquity of the ancient Fauna of Brazil, which otherwise would have been left involved in complete darkness.”



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Base of the Skull of *Macdonald Platyrhina*  
Plate 10





Engraved by C. H. Bennett.

Side View of the Skull of Tazacaca  
one third the Natural Size

Traces taken by Smith, Esq. & Co. of the London.

Blowing the air out.

Pl. 11.





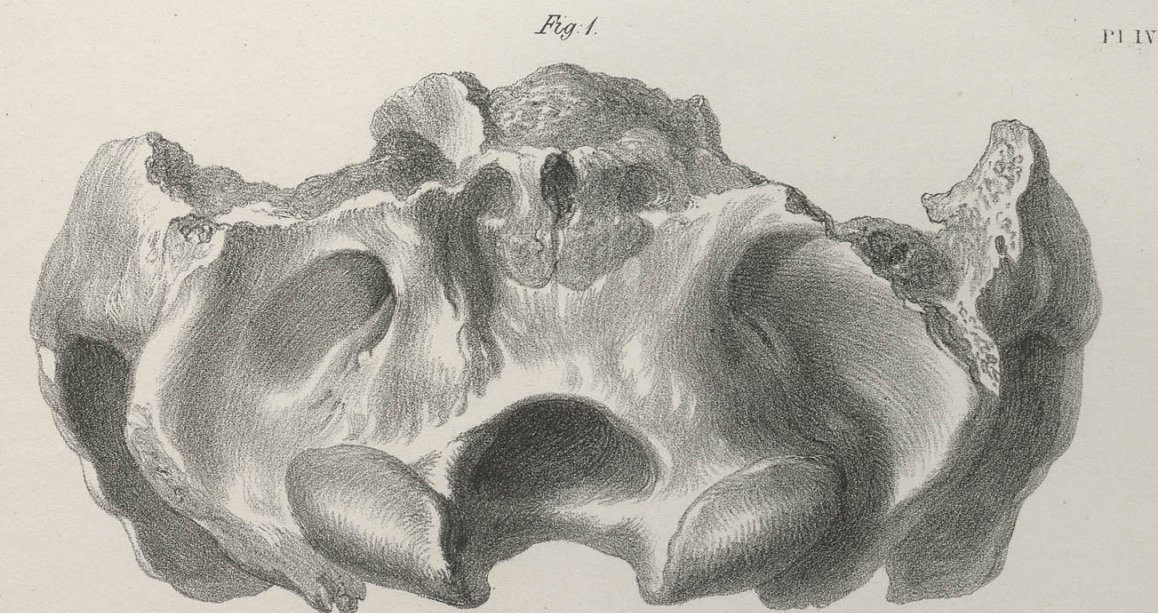
*Drawn by J. G. Keble.*

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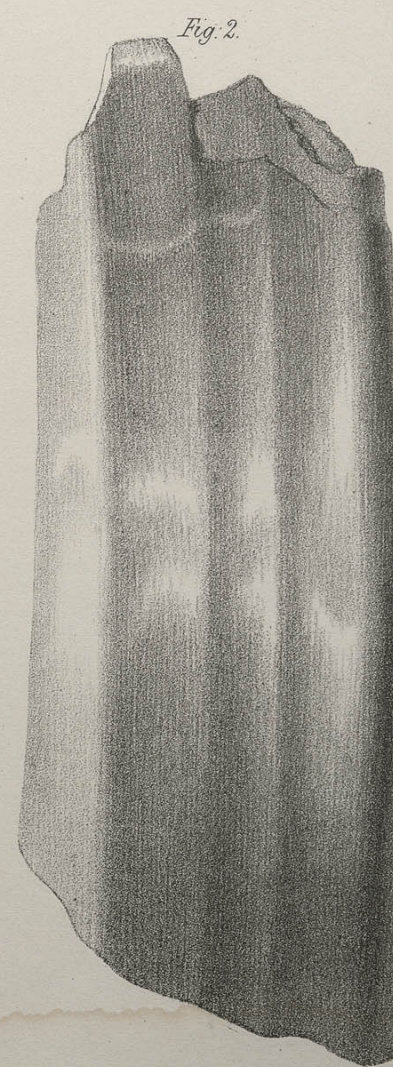
*Top View of the Skull of the Tirodon.  
One third the Nat. Size.*

*Published by Smith, Elder & Co. 65 Cornhill London.*





*1/3 the Nat. Size.*



*6th Grinder. Nat. Size.*

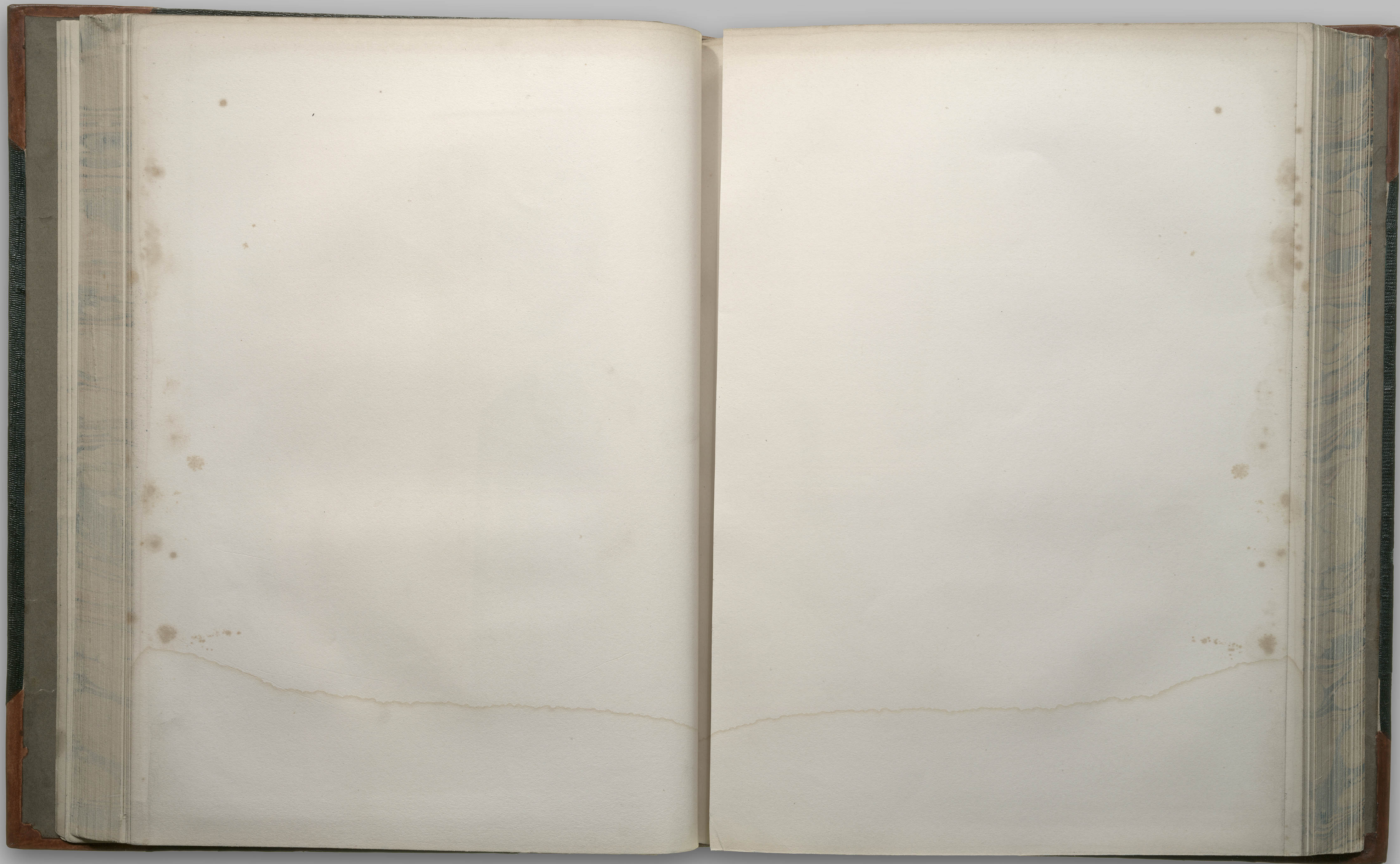
*6th Grinder. Upper Jaw.  
Nat. Size.*

*Printed by C. Hollman del.*

*Taxodon Platensis*

*Published by Smith, Elder & Co. 65, Cornhill London.*







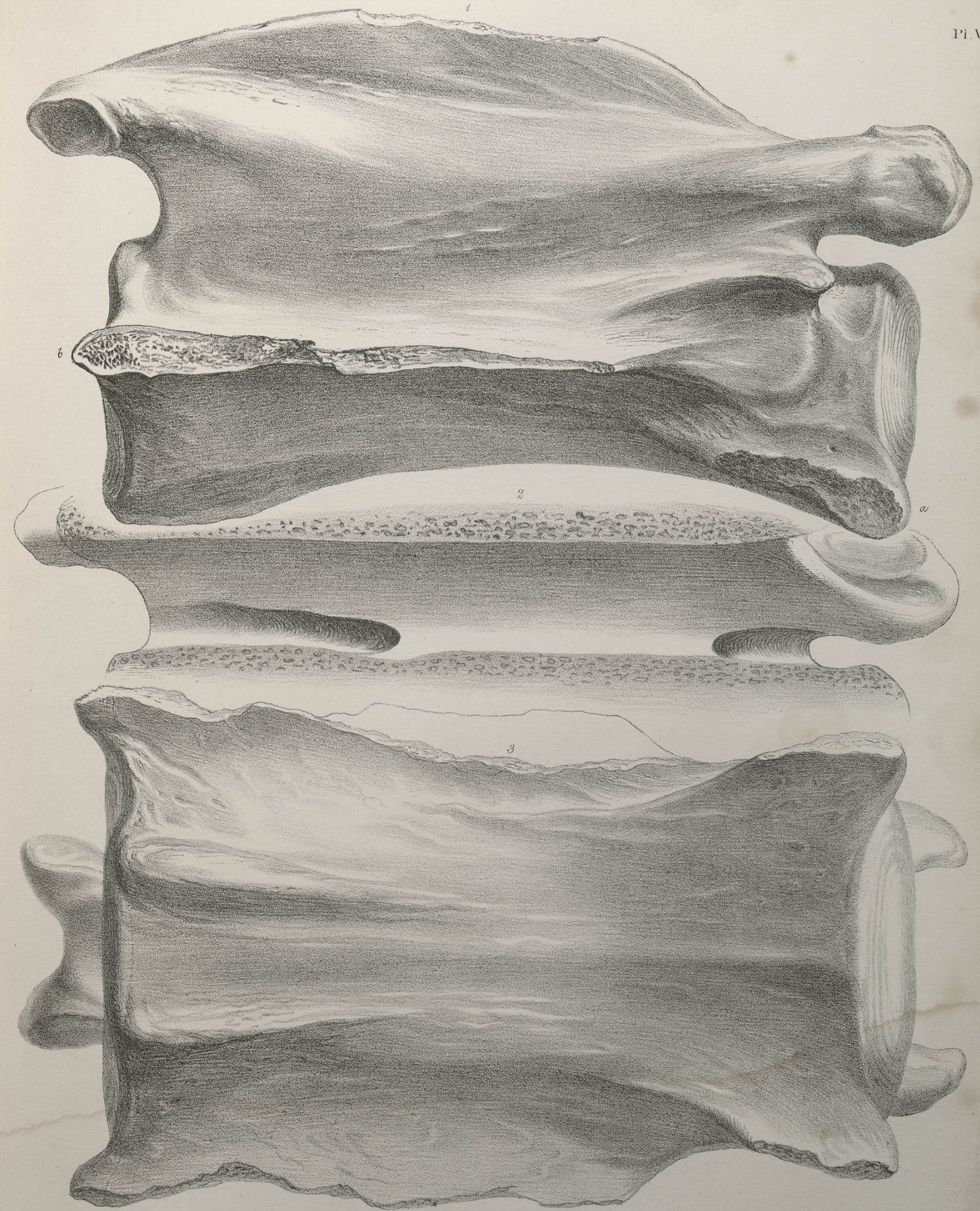


Fragments of the lower Jaw and Teeth of a *Taxodon*.  
Nat. size.

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Engraved by C. H. Stansfeld

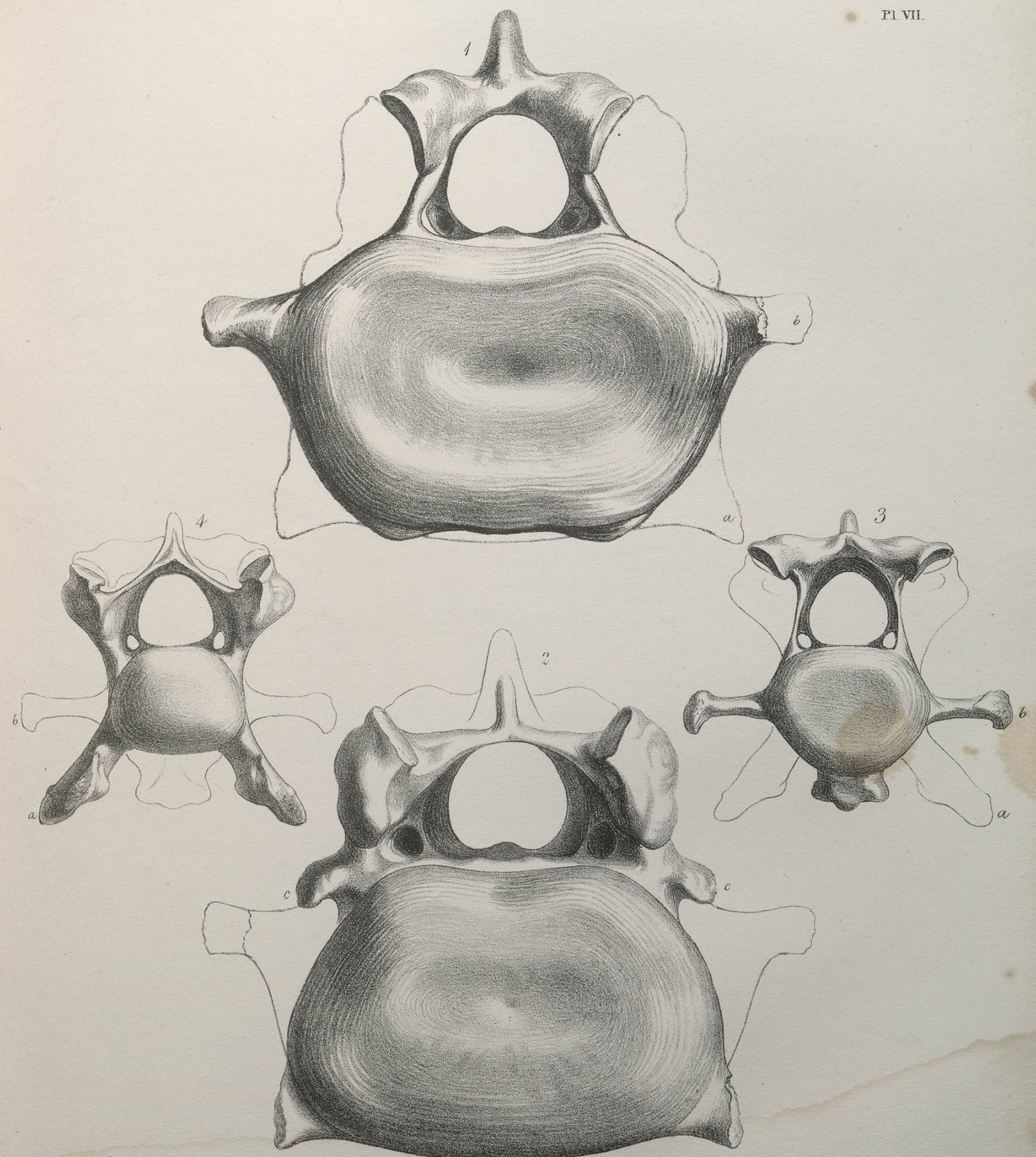




*Cervical Vertebra of Macmurenia.*

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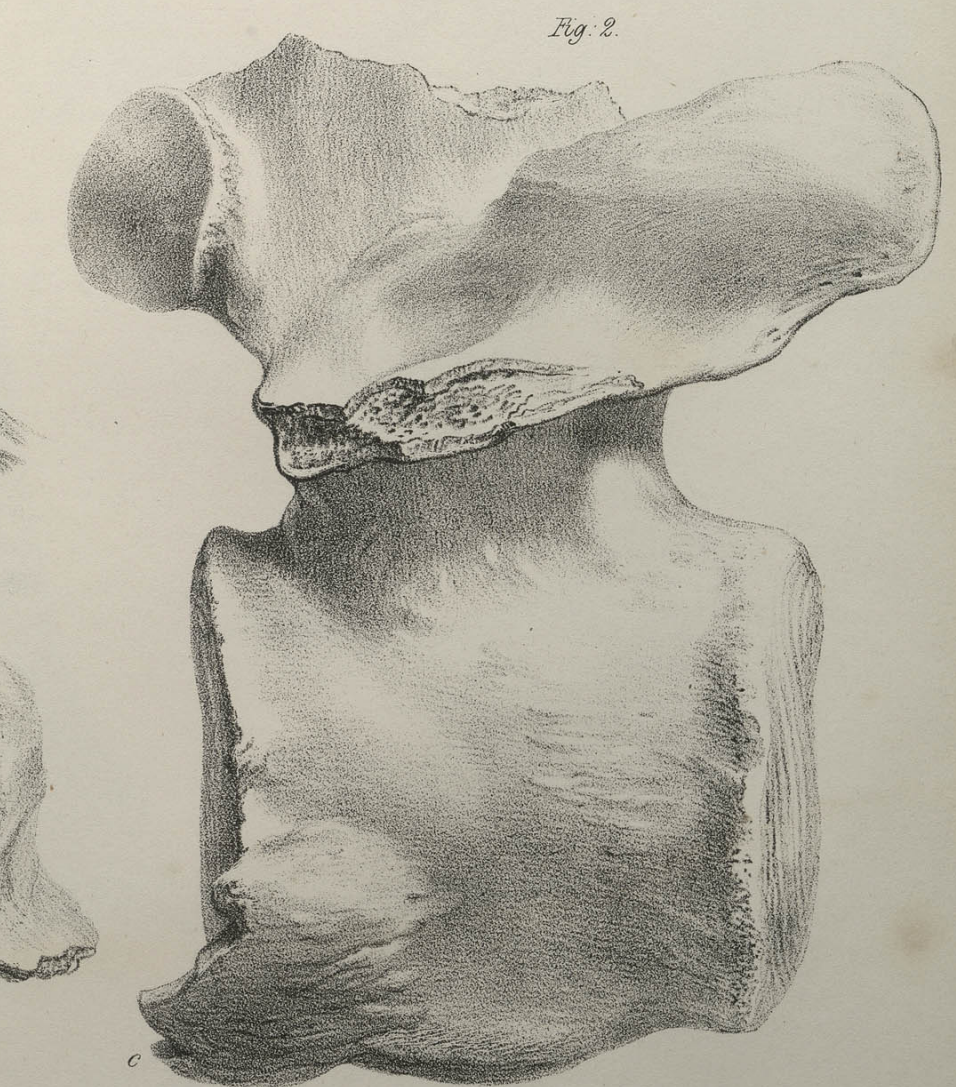
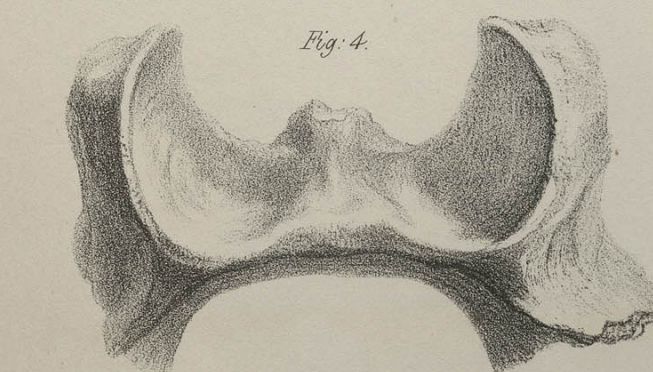
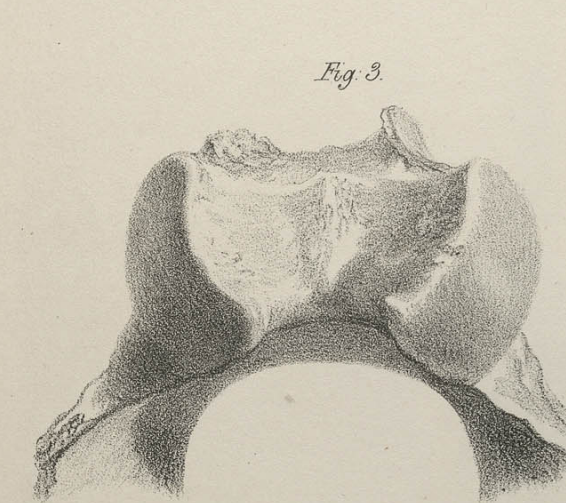
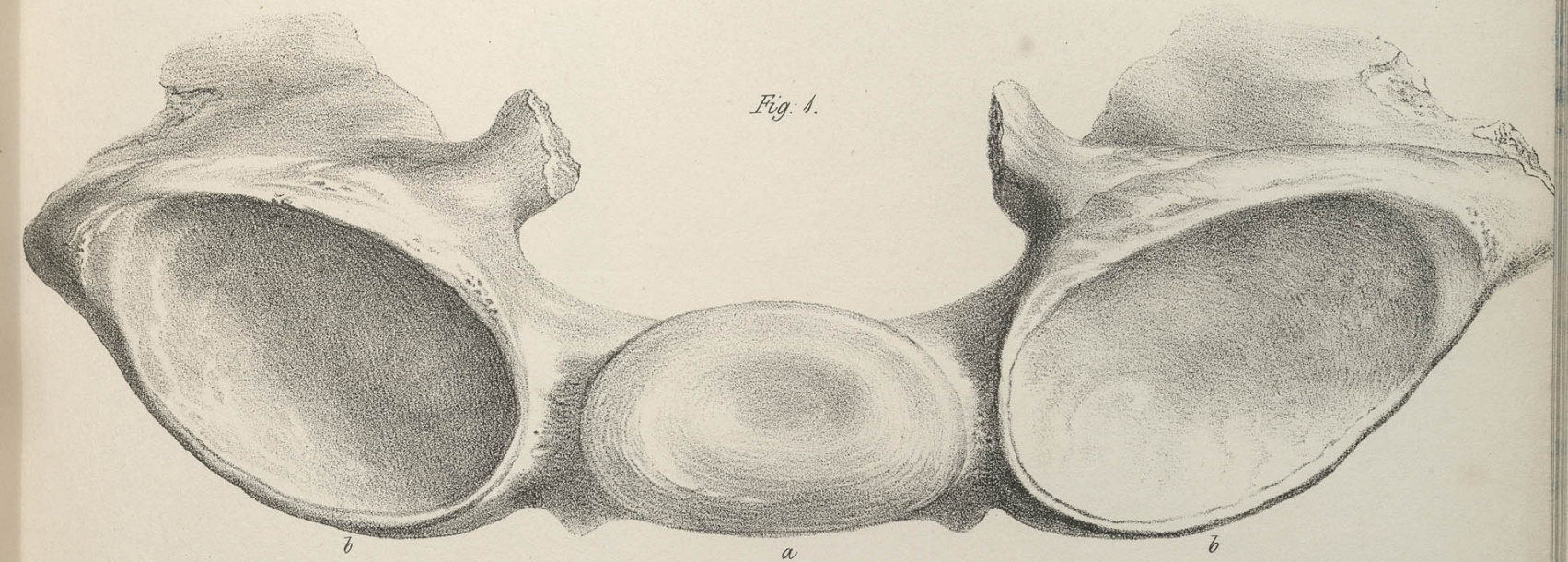
Nat. Size.

Printed by C. Hullmandel

Cervical Vertebrae of  
1. 2. *Macrauchenia* 3. 4. *Auchenia*.

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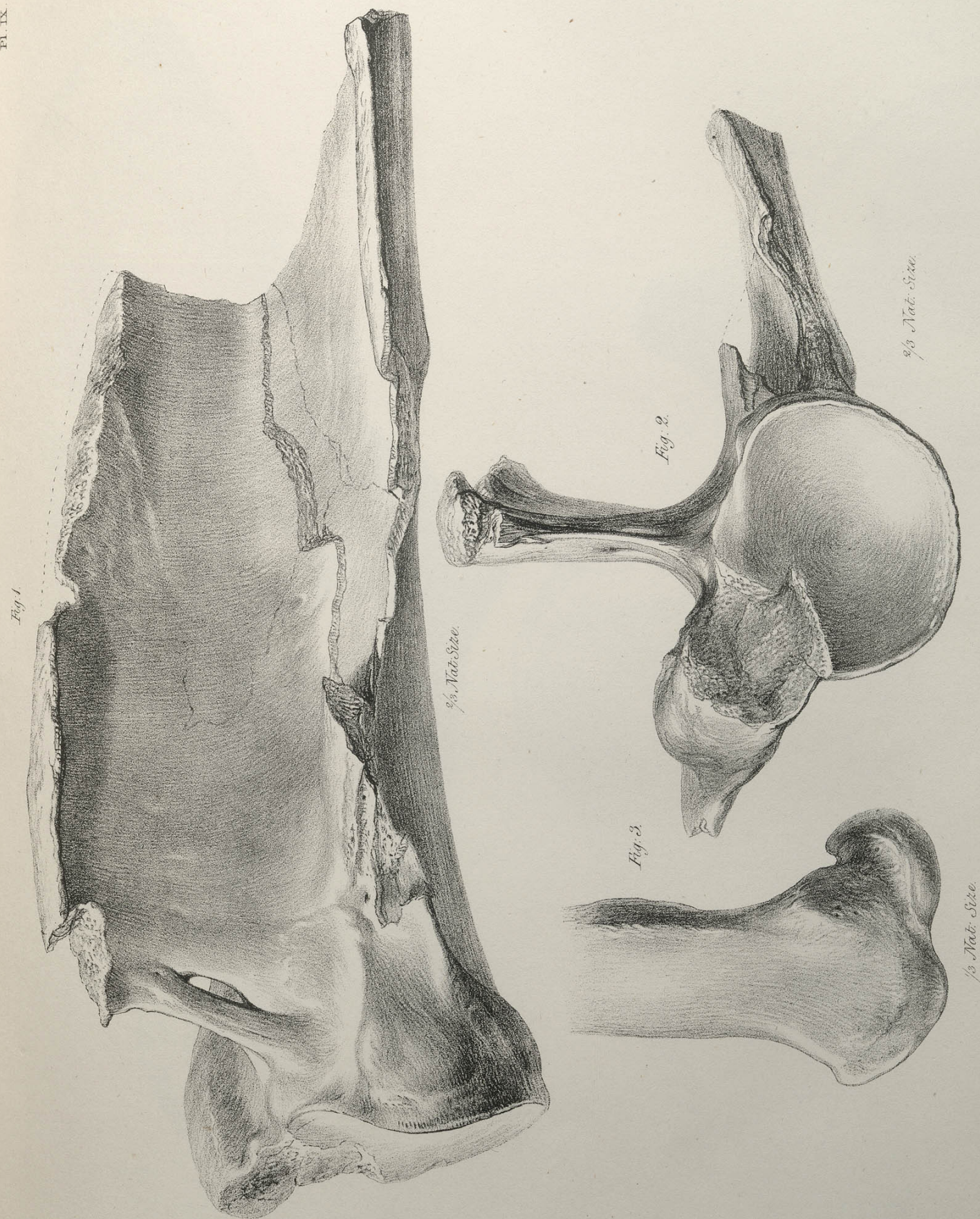
*Lumbar Vertebra, Macrauchenia.*

*Fig. 1. Posterior View of last lumbar. Fig. 2, 3 & 4. Fourth lumbar Vertebra.*

*Nat. Size.*

*Published by Smith, Elder & Co. 65, Cornhill, London.*



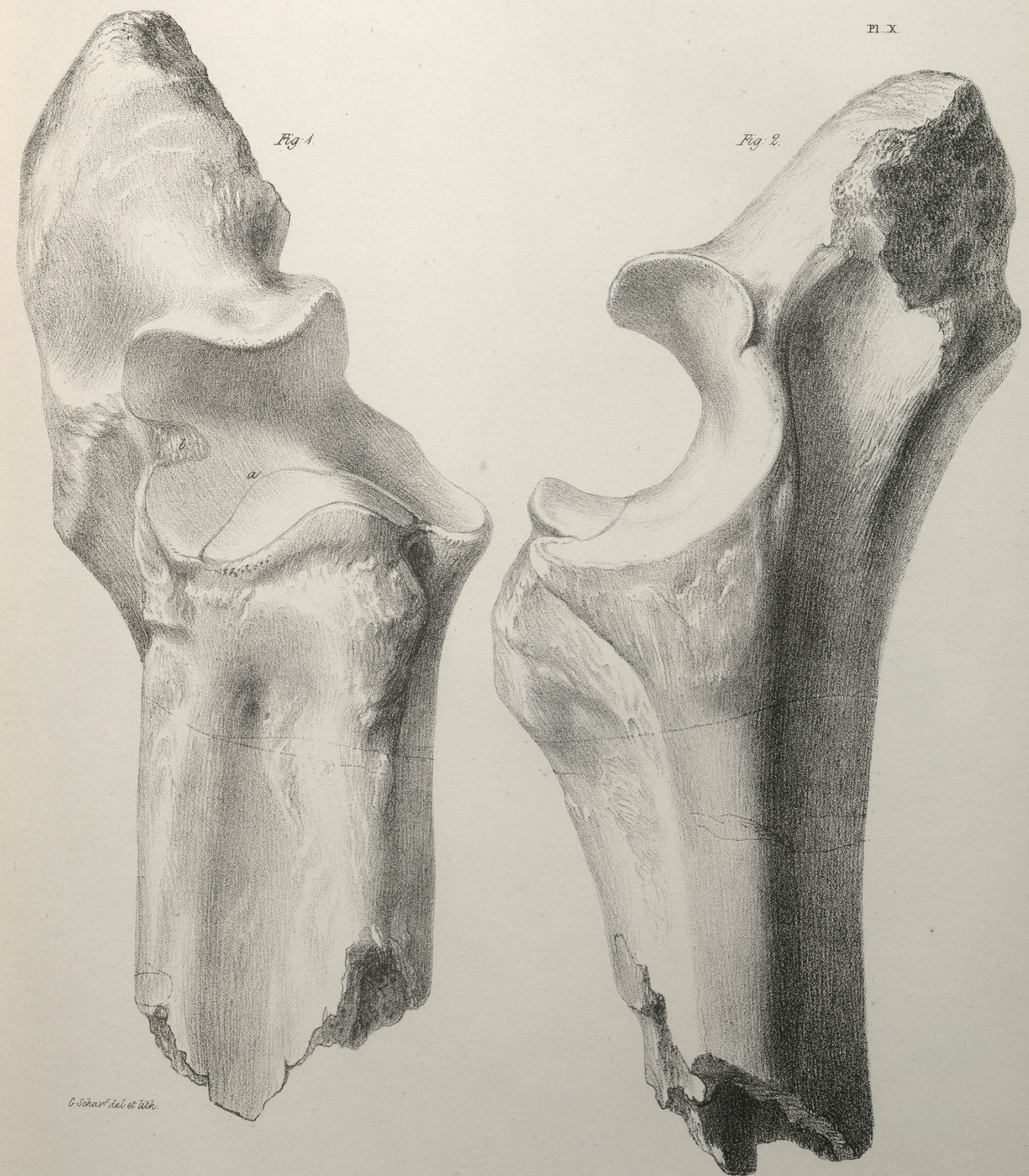


*Macrauchenia.*  
 Fig. 1. 2. Scapula. Fig. 3. Femur.

Taken from Nature by G. Schaefer.

Engraved by Smith, Elder & Co., London.





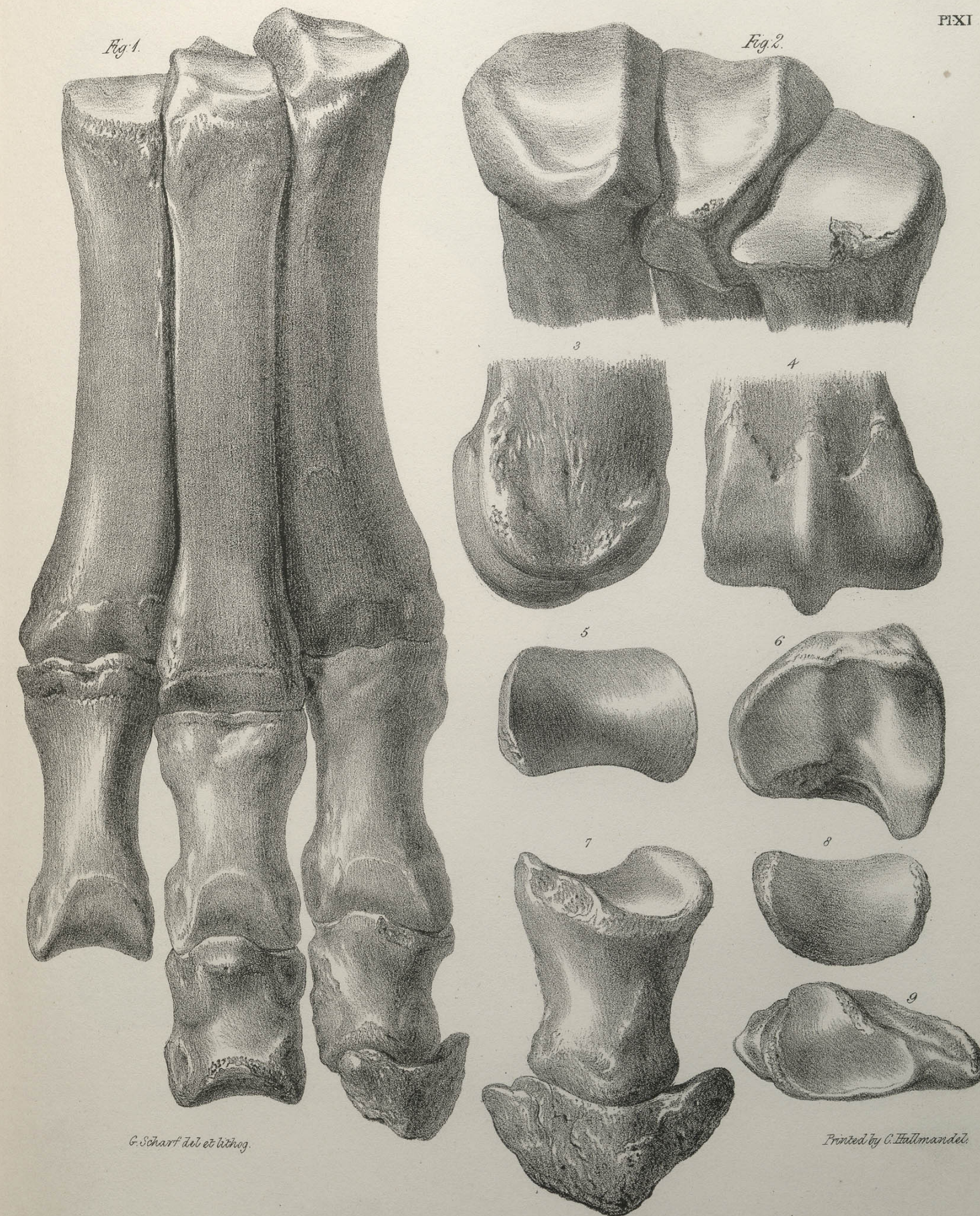
Pl. X.

Fig. 1.

Fig. 2.

Proximal Extremity of ankylosed Ulna and Radius *Macrauchenia*.  
 1/2 Nat. Size.  
 London. Published by Smith, Elder & Co. 1845.





G. Schart del et lith.

Printed by C. Hullmandel.

Bones of the right fore-foot, *Macrauchenia*.  
Fig. 1,  $\frac{3}{8}$ . 2-9, Nat. Size.

Published by Smith, Elder & Co., 65 Cornhill.



Fig. 1.



*1/2 the Nat. Size.*

*Looking from Nat. by G. Scharf.*

Fig. 2.



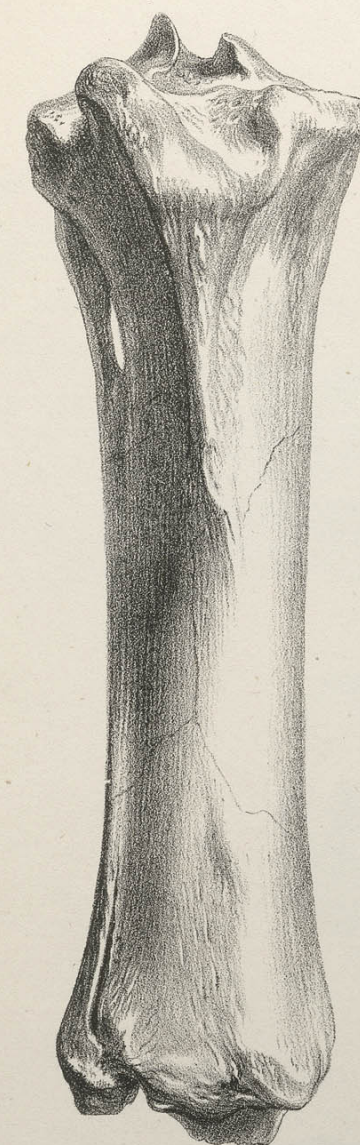
*2/3 the Nat. Size.*

*Engraved by A. Hallman.*

*Right Femur. Macrauchenia.  
Published by Smith, Elder & Co. 65 Cornhill.*



Fig. 1.



$\frac{2}{3}$  Nat. Size.

Fig. 2.

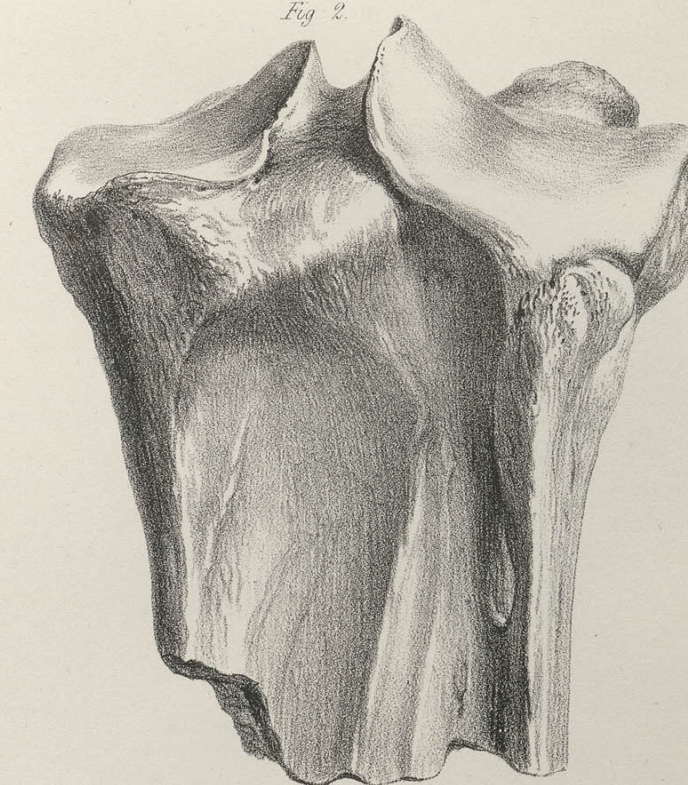


Fig. 3.

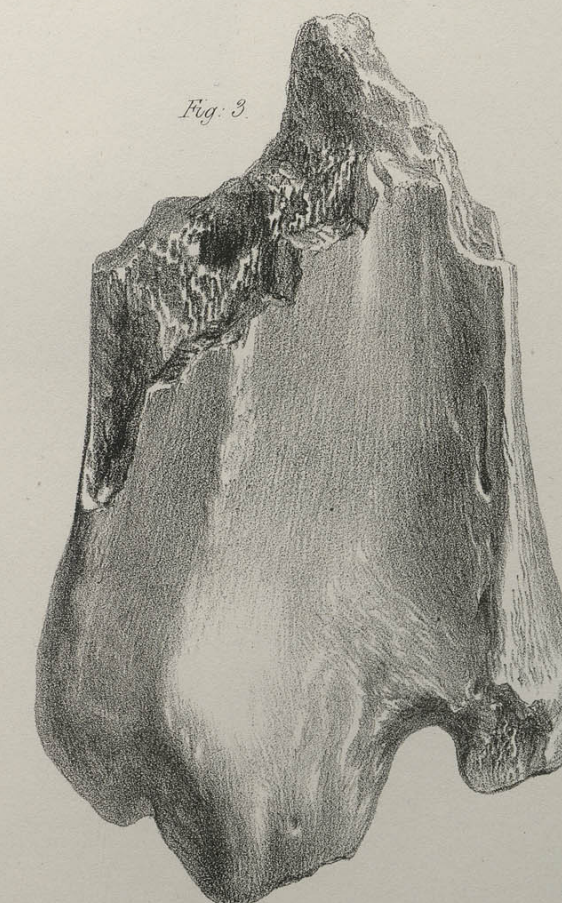
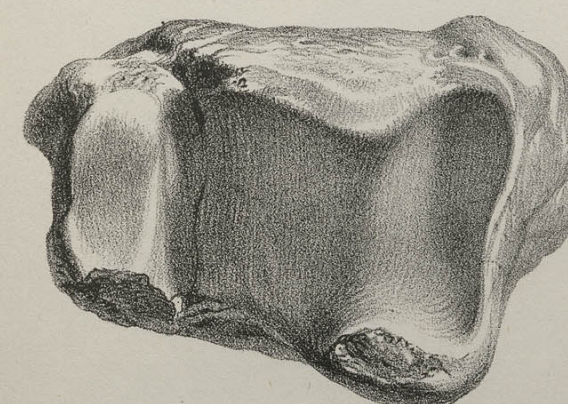


Fig. 4.



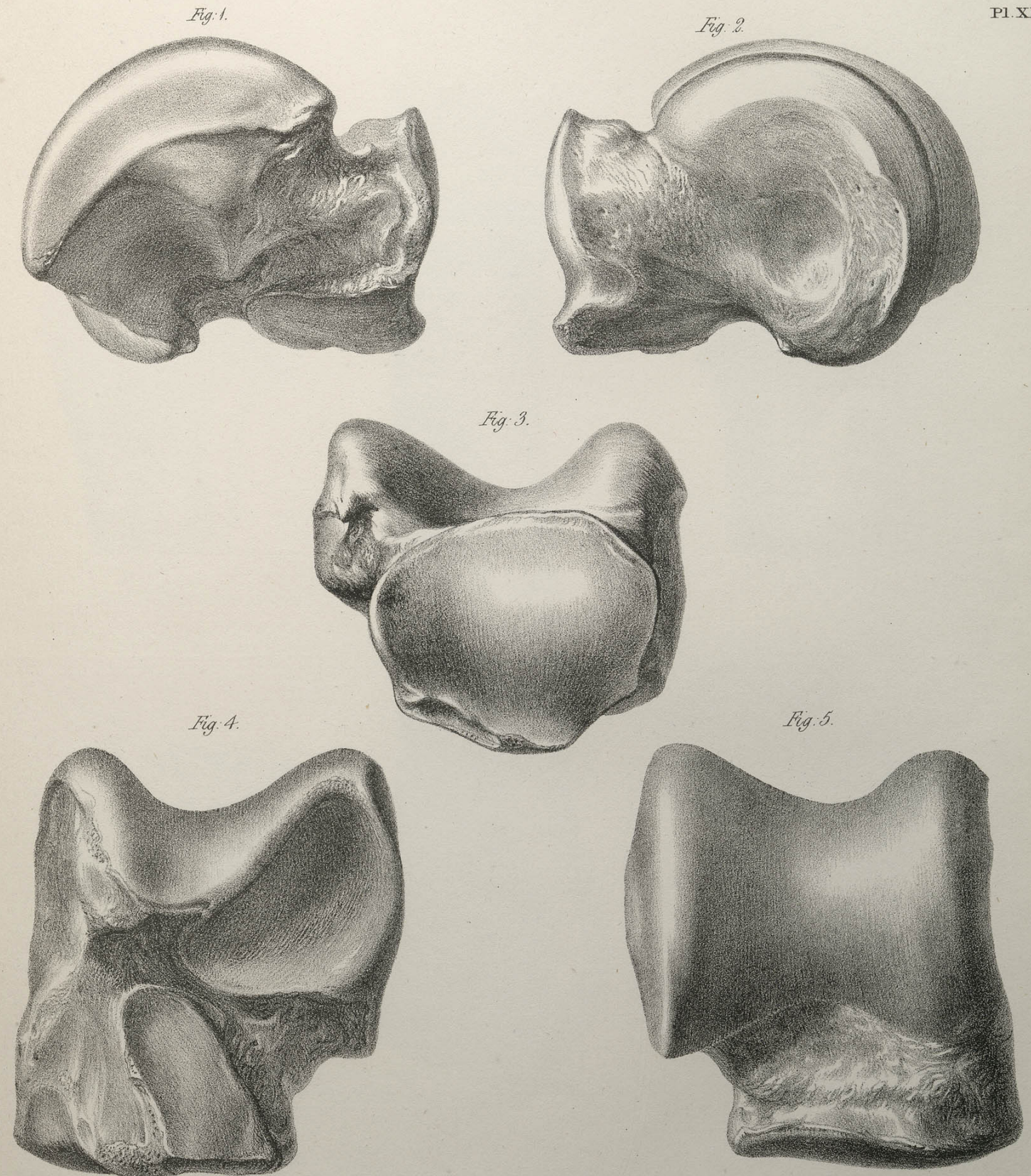
Lithog. from Nat. by G. Schaeff.

Printed by C. Hullmandel.

*Macrauchenia.*  
Right Tibia and Fibula. — Fig. 2-4.  $\frac{2}{3}$  Nat. Size.

Published by Smith, Elder & Co. 65, Cornhill.



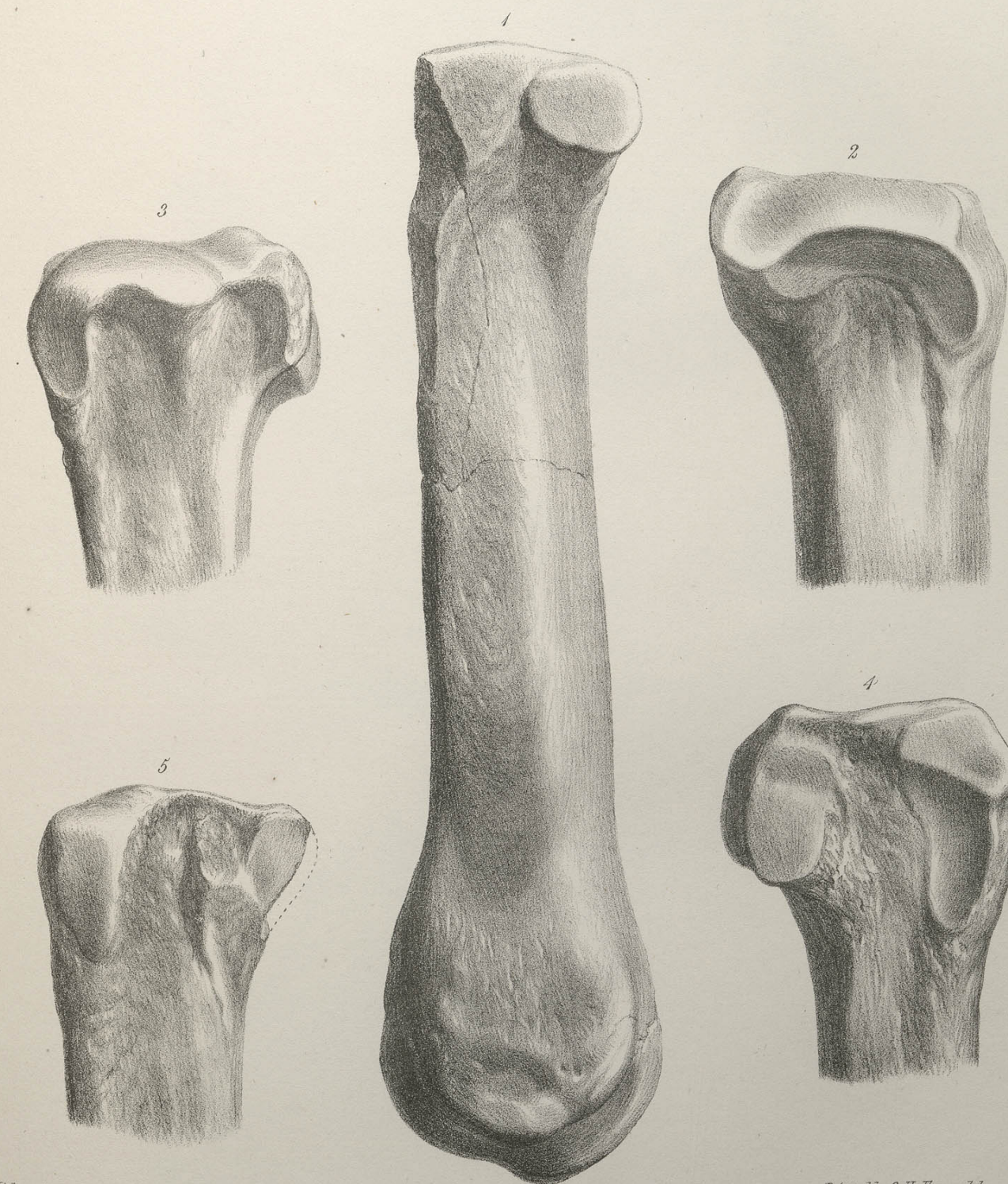


Engr. from Nature by G. Scharf.

*Right Astragalus. Macrauchenia.*  
Nat. Size.

Published by Smith, Elder & Co. 65, Cornhill.





*Drawn from Nature by G. Scharf*

*Printed by C. Hallmandel.*

*Macrauchenia*  
Fig. 1. Metatarsal 2-5. Metacarpals. Nat. Size.

*Published by Smith, Elder & Co. 65, Cornhill*





Indrag. from Nature by G. Scharf.

Printed by C. Hoare.

Fragment of the Cranium of the *Globosotherium*.  
1/2 Nat. Size.



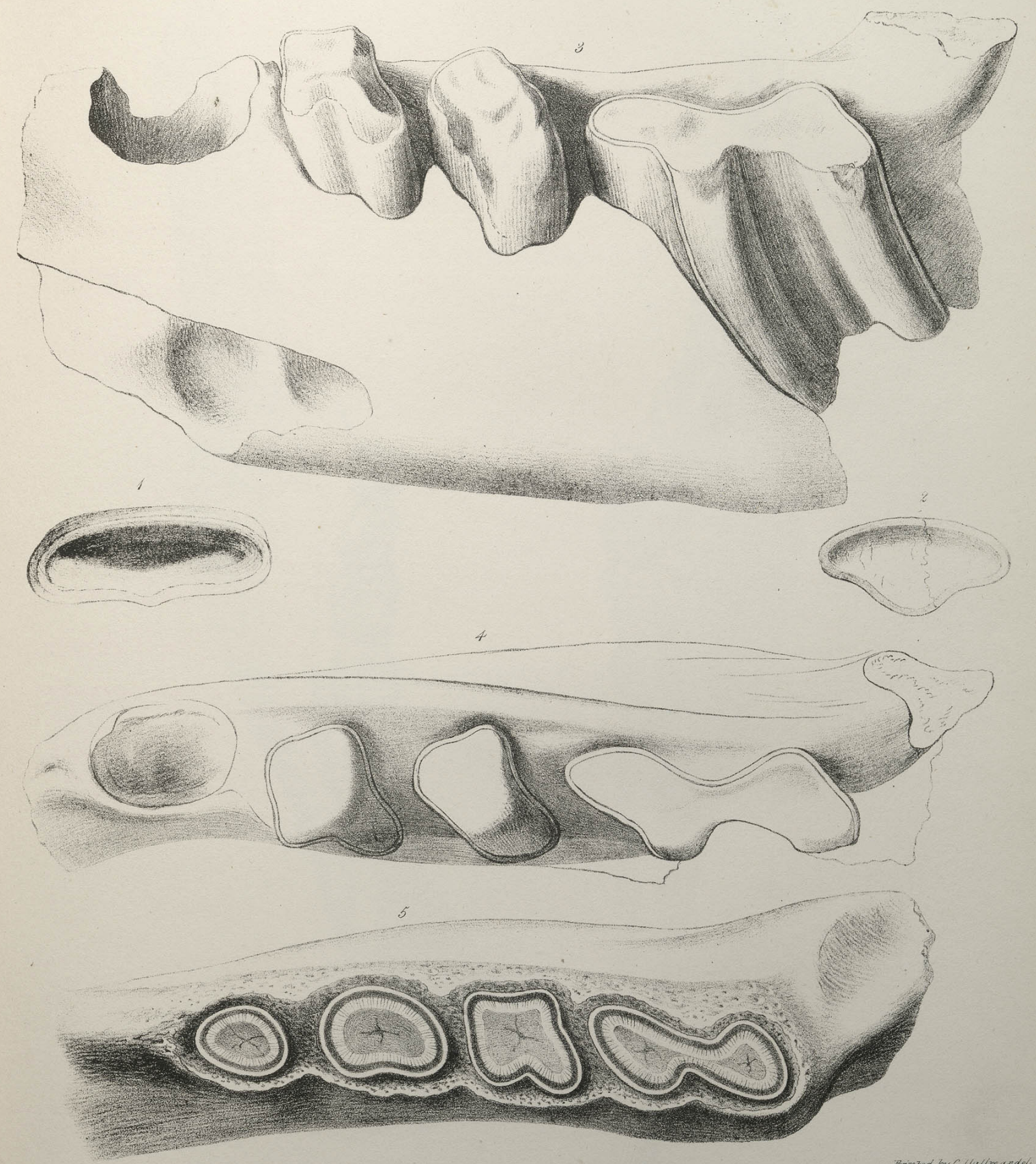


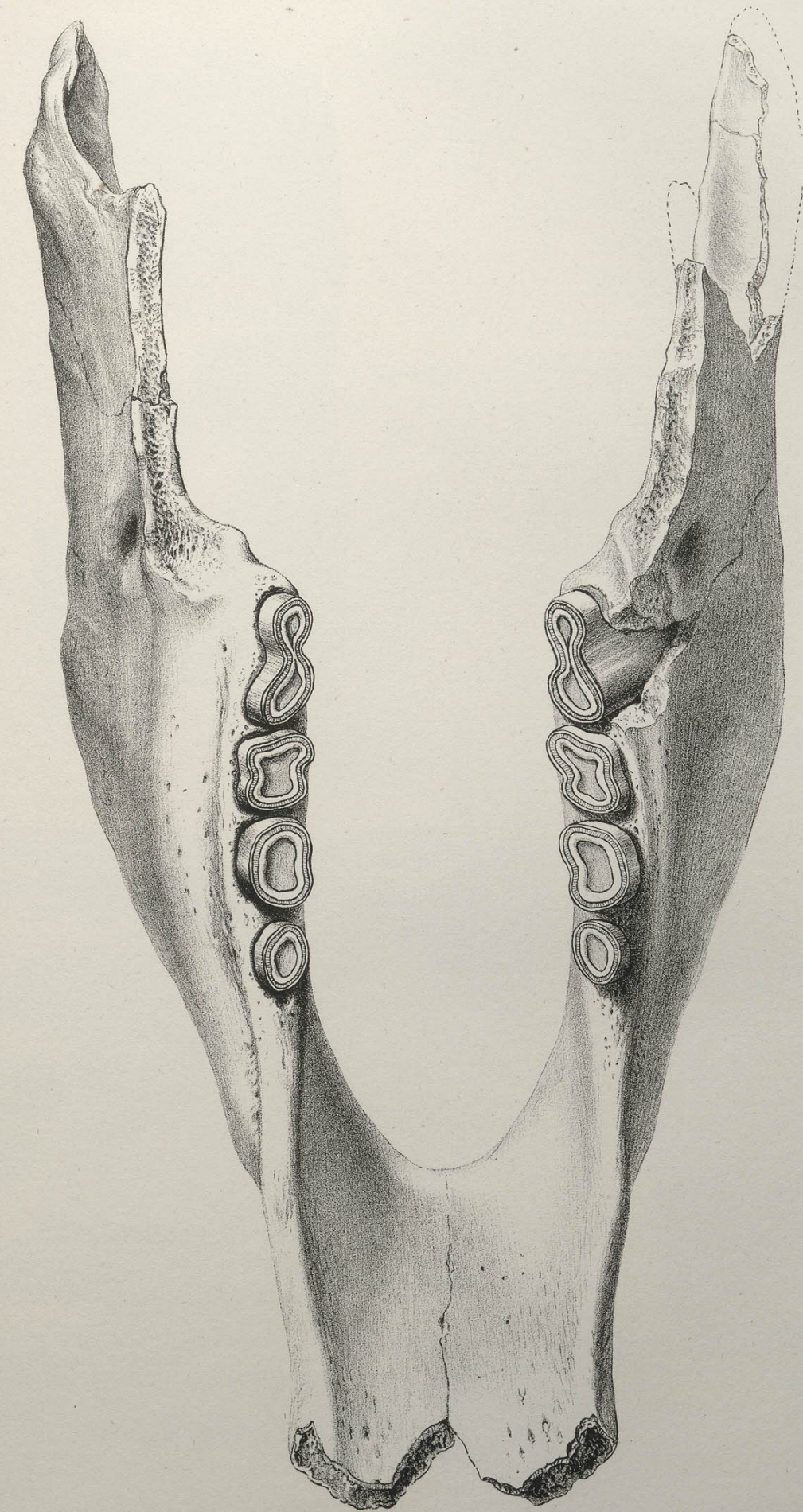
Fig 3 4. L'aurillard del Fig 5 G. Schar del et lithog.

Printed by C. Mulman del.

1. *Megalonyx Jeffersoni*. 2. *Meg. laqueatus*. 3 4. *Mylodon Harlani*. 5. *Myl. Darwini*.

Published by Smith, Elder & Co. 65 Cornhill.



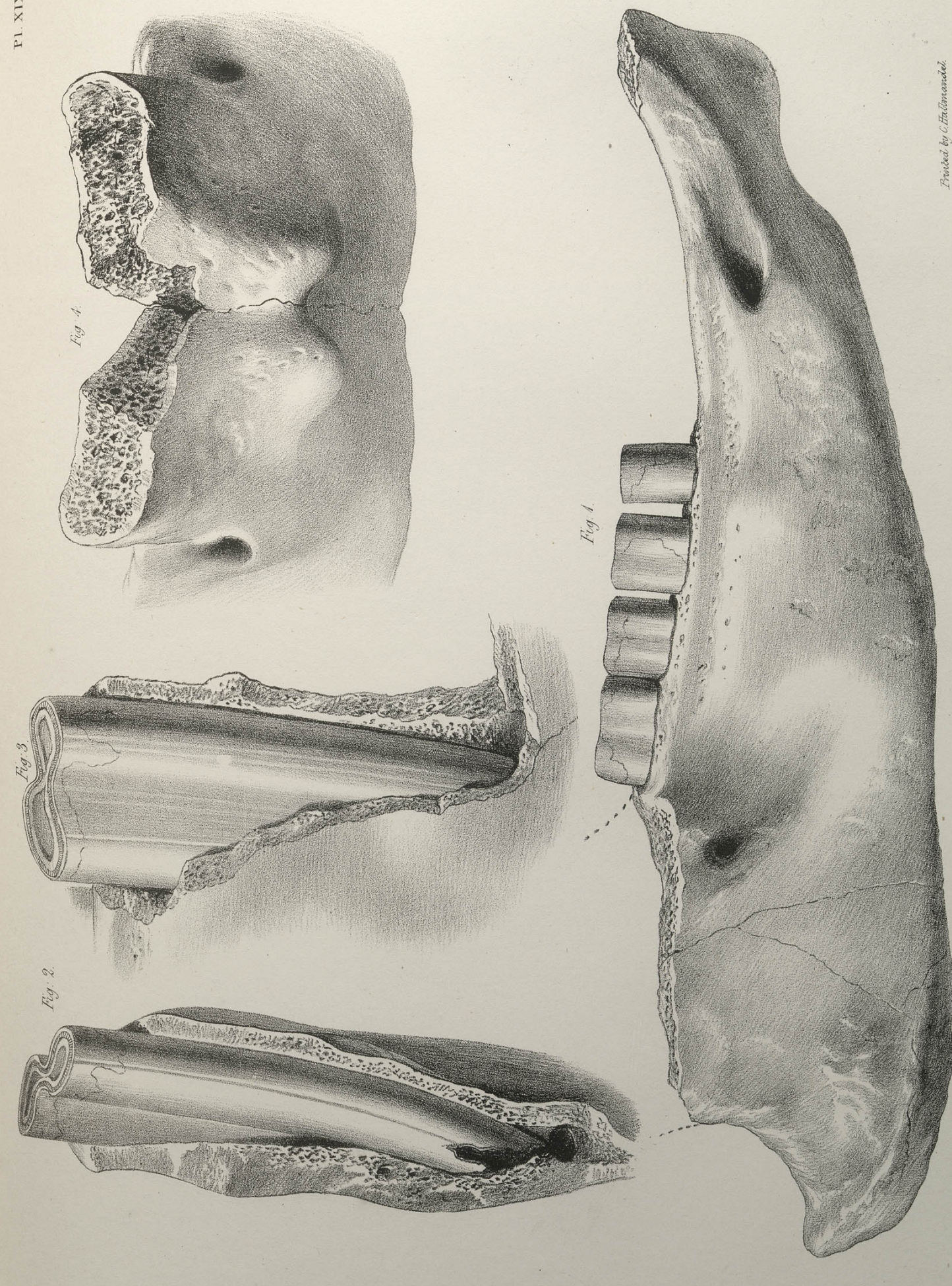


C. Seay del et lith

*Mylodon darwini*

Printed by C. Edmunds





Printed by C. Chapman.

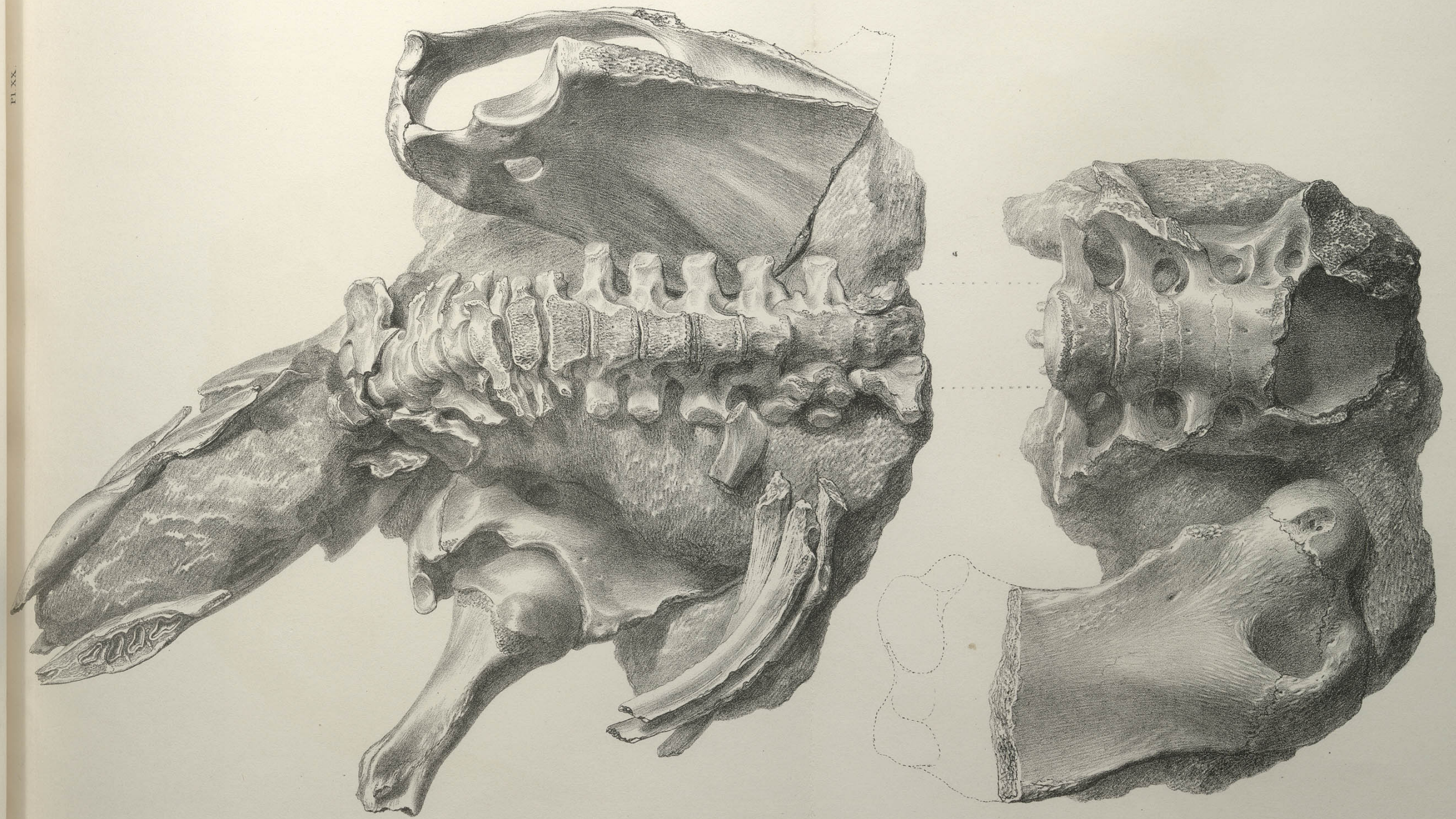
*Neoborn.*  
Fig. 1. 9/16. Fig. 2. 1/16. Fig. 3. 1/16. Fig. 4. 1/16.

C. Chapman del. et lith.









Engraved by C. Sharpe

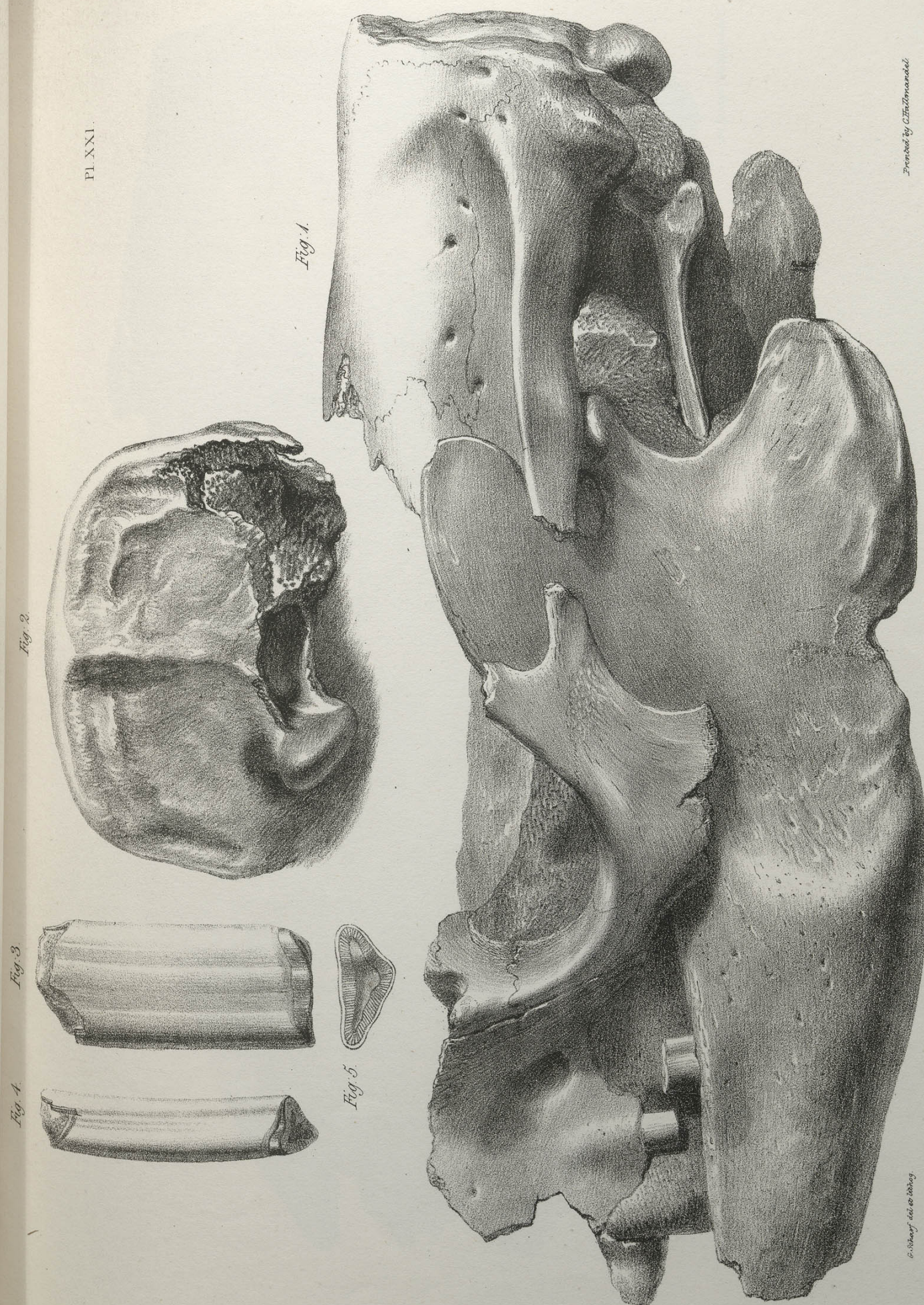
*Scelidotherium*  
To Nat. Size

Published by Smith, Elder & Co. 25, Abchurch Lane, London, E.C. 4

Engraved from Nature by C. Sharpe



PL. XXI.



Printed by C. Whitman.

C. Whistler del. et lith.

*Scelidotherium*  
Fig. 1. Skull. Fig. 2. Jawbone. Fig. 3. Molar. Fig. 4. Molar. Fig. 5. Canine.





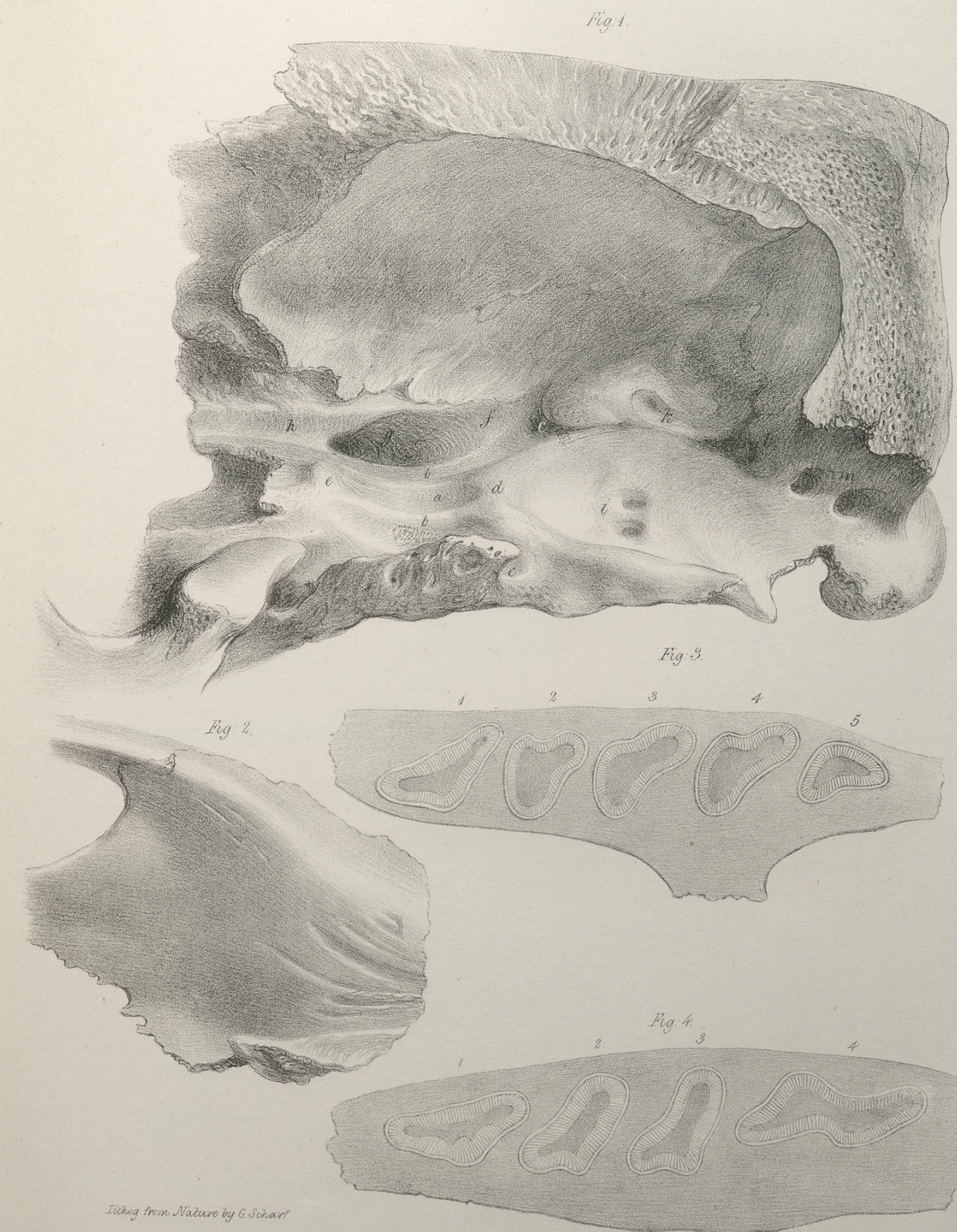
Prepared by C. H. Blandford

*Scaliotherium*

Engraved by Smith, Elder & Co. Cornhill, London.

Drawn from the original by C. Blandford





Taken from Nature by C. Schaefer

*Cranial Cavity and Dentition of Scelidotherrum.*  
*Nat. Size.*

Engraved by Martin Taylor & Co. 68, Cornhill.



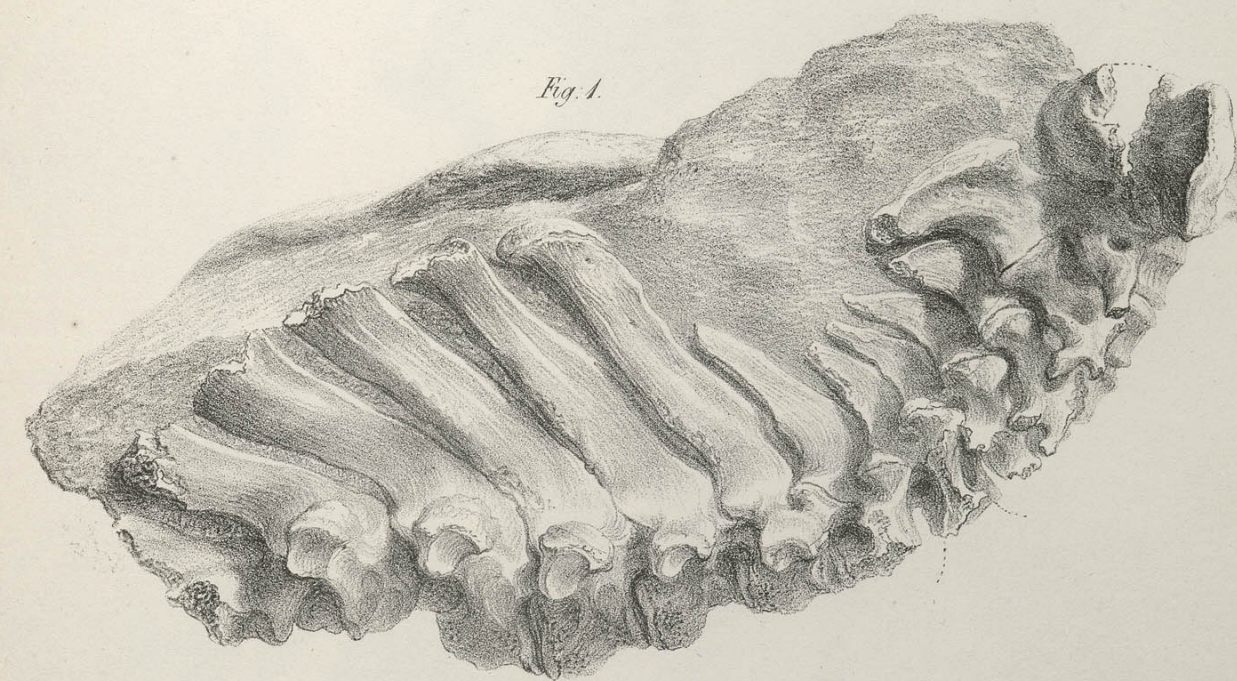


Fig. 1.

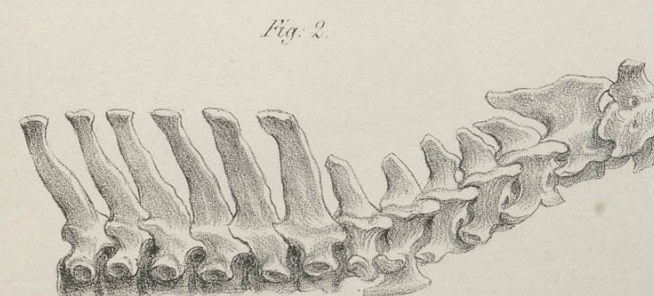


Fig. 2.



Fig. 3.

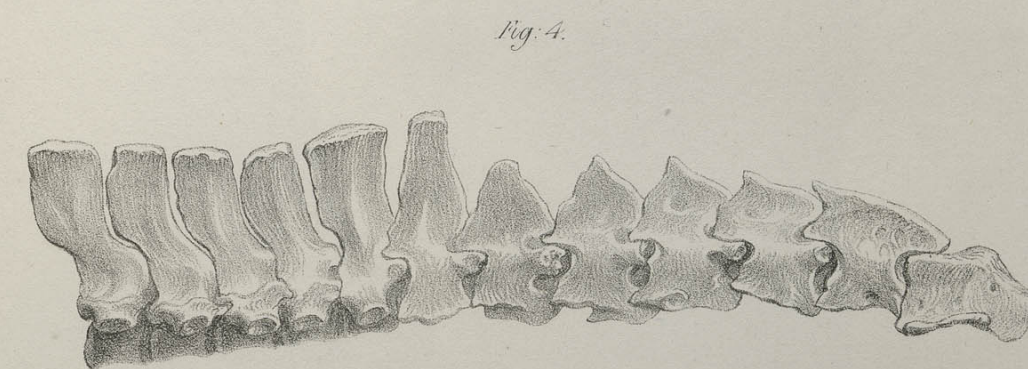


Fig. 4.

*Engraving from Nat. by C. Schaefer.*

*Cervical and Anterior dorsal Vertebrae.*  
 Fig. 1. Scelidotherium. Fig. 2. Orycteropus. Fig. 3. Armadillo. Fig. 4. Great Anteater.  
 One third Nat. Size.

*Published by Smith, Elder & Co. 65, Cornhill.*





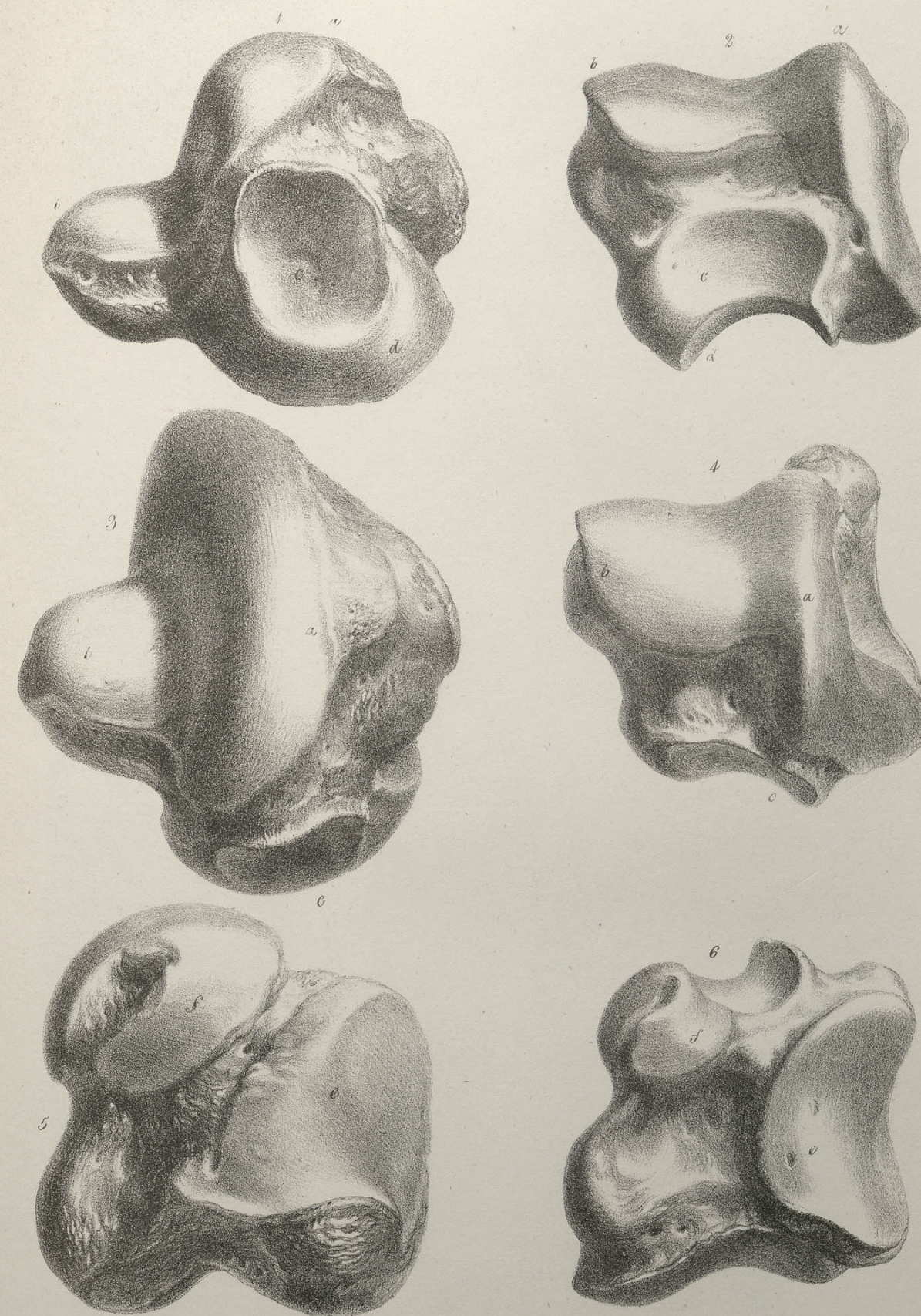
*Discovered from Taurus & Schist*

*Scelidotherium* 1/2 Nat. Size.

*Engraved by Smith, Elder & Co. 76 Cornhill*

*Printed by C. M. H. & Co.*





*Left Astragalus*

*Fig. 1, 3, 5. Megatherium: 2, 4, 6. Scladotherium: 3, 5. Nat. Size.*

*Published by Smith, Elder & Co. 57, Cornhill.*

*Printed by G. Hallman.*





*Tooth from Nat by G. Schaff.*

*Scelidotherium.*  
 Fig. 1 2 3 Nat. Size 3 4 5 Nat. Size.  
 Published by Smith, Elder & Co. 65 Cornhill.





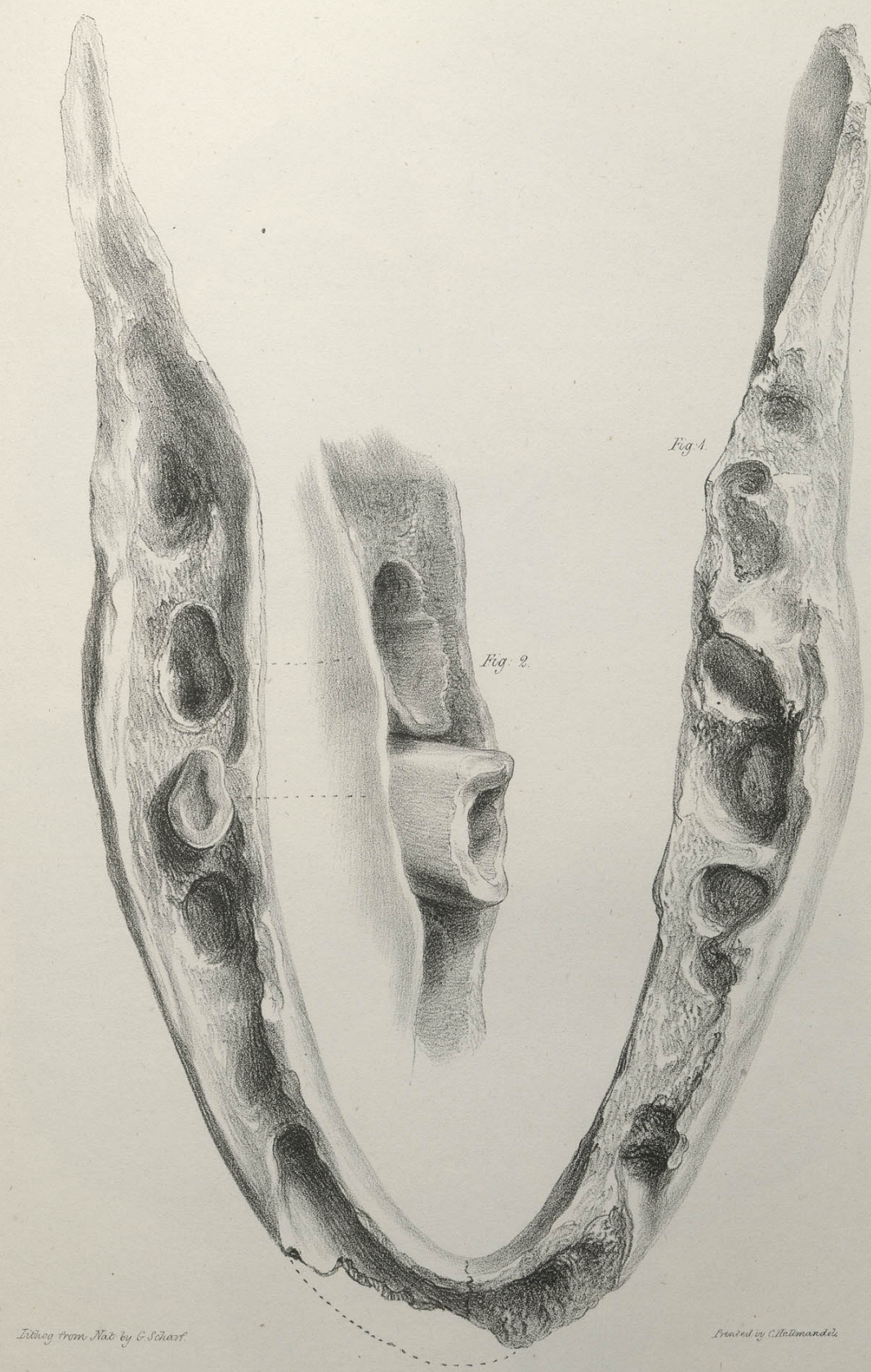
Engraving from Harvey & Schuchert.

Printed by C. H. M. Arnold.

Left Astragalus.

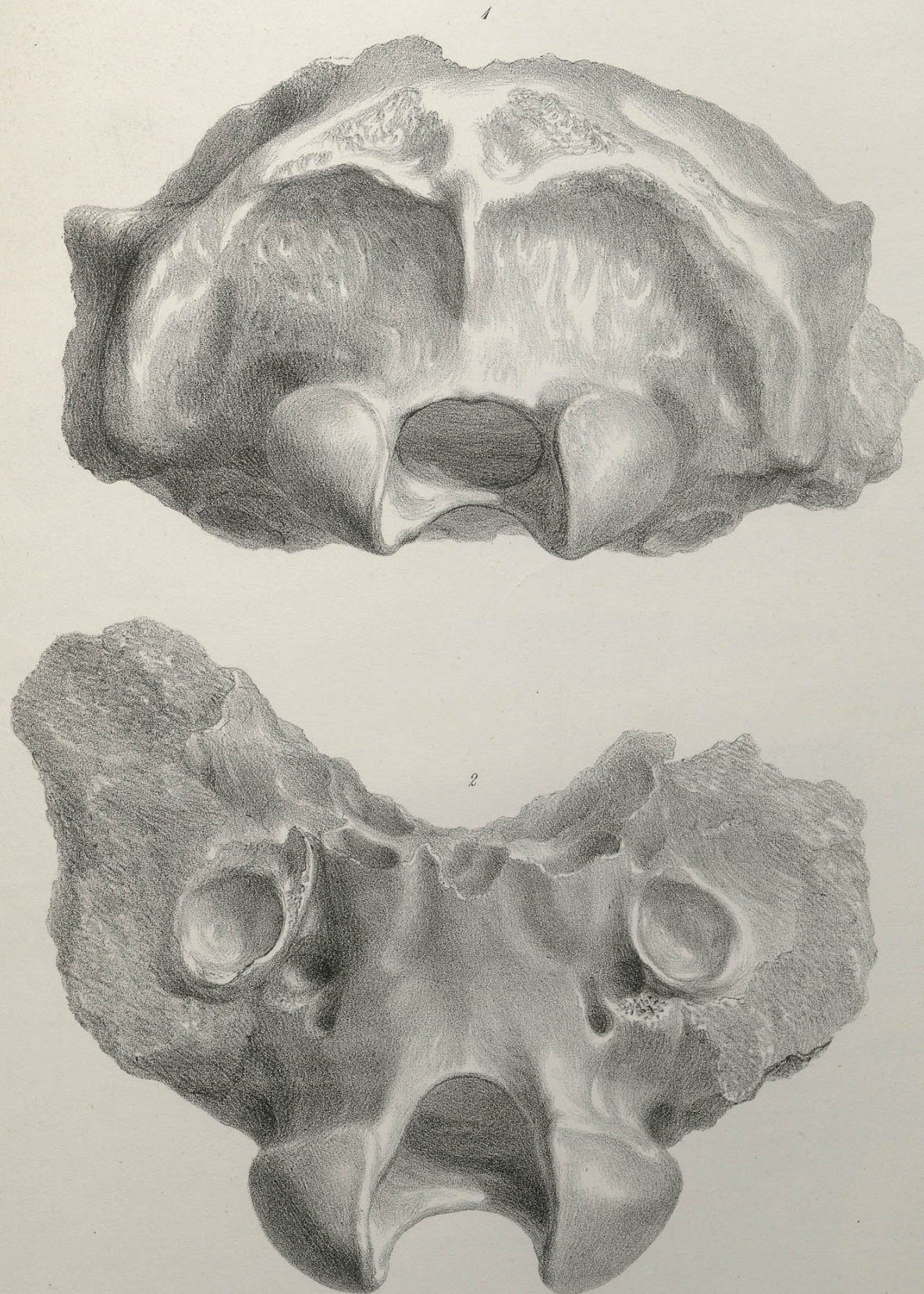
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*Lower Jaw of Megalonyx.*  
Fig. 1.  $\frac{1}{2}$  Fig. 2. Nat. Size.



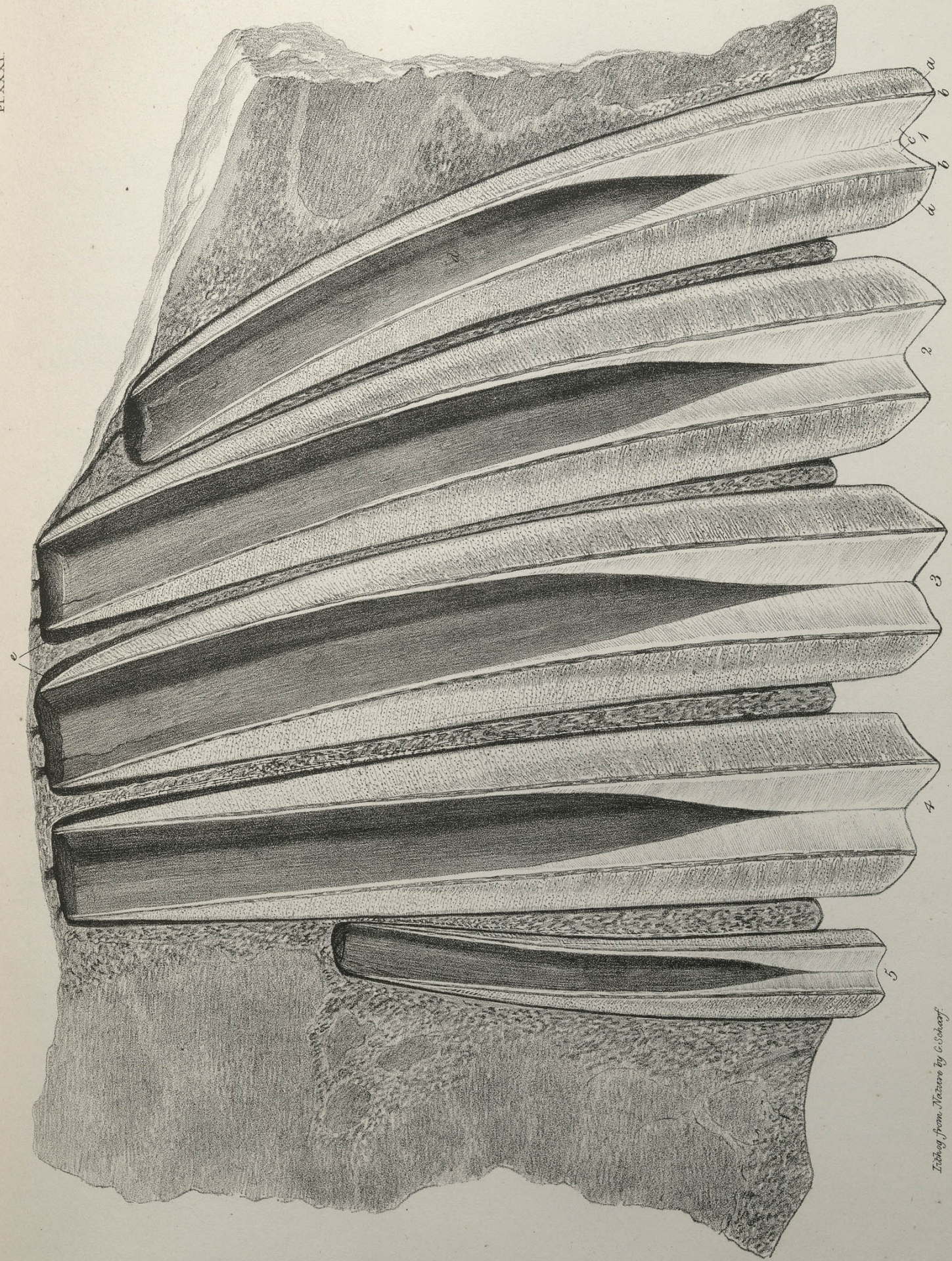


*Sketch from Noddy G. Scharf*

*Printed by C. Hullmandel*

*Megatherium.  $\frac{1}{2}$  Nat. Size*



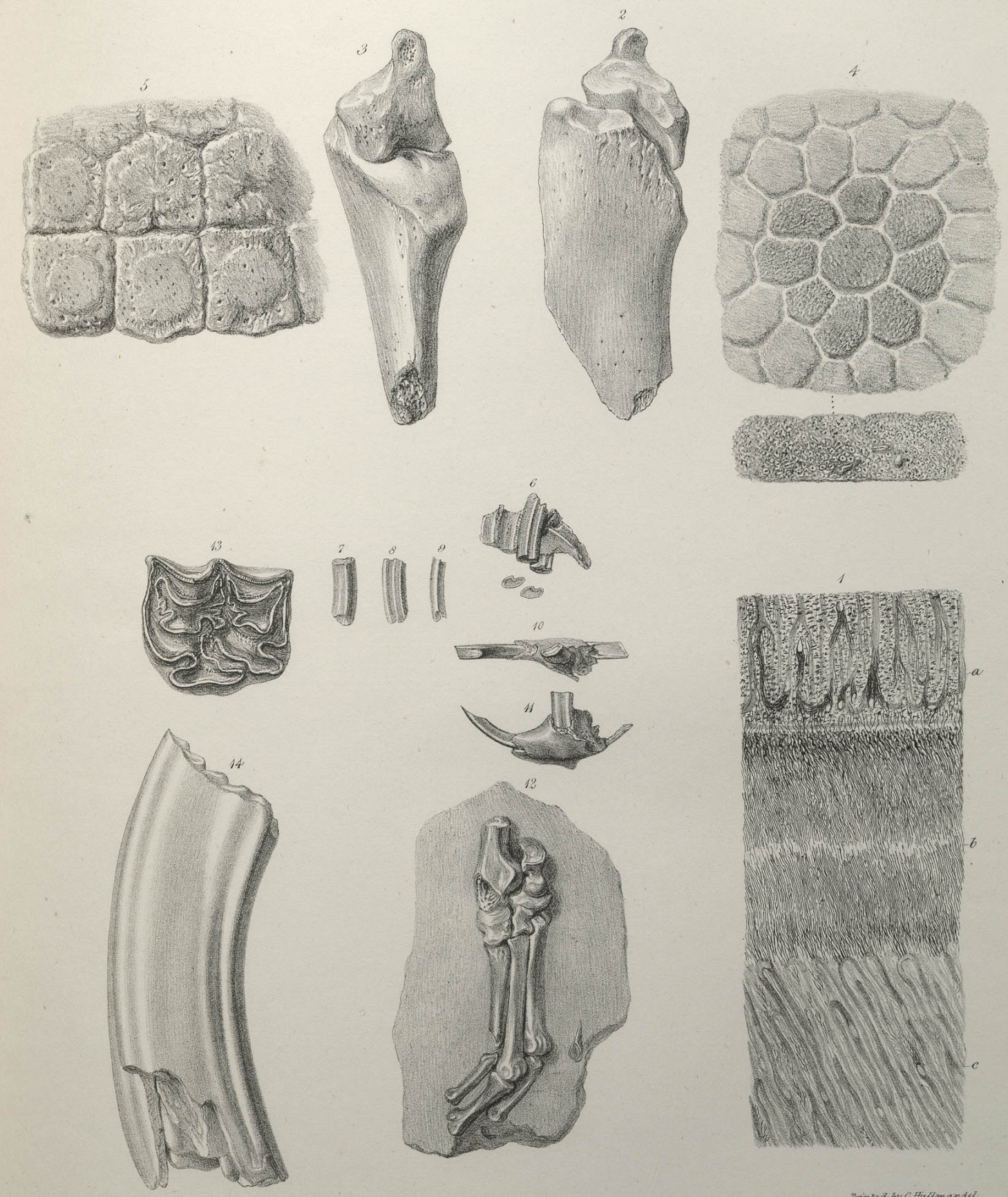


Printed by C. H. Stansfeld.

Section of the superior maxillary teeth,  
*Megatherium*.

Engraving from Nature by C. Darwin.





Engraved from Nat. by G. Schaeffer

Printed by C. Hallman del.

1. *Megatherium*. 2-5. *Hoplophorus*. 6-12. *Onomys*. 13-14. *Equus*.



THE  
ZOOLOGY  
OF  
THE VOYAGE OF H. M. S. BEAGLE,  
UNDER THE COMMAND OF CAPTAIN FITZROY, R. N.,

DURING THE YEARS

1832 TO 1836.

PUBLISHED WITH THE APPROVAL OF  
THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

Edited and Superintended by  
CHARLES DARWIN, ESQ. M. A. F. R. S. SEC. G. S.  
NATURALIST TO THE EXPEDITION.

PART II.  
MAMMALIA,

BY  
GEORGE R. WATERHOUSE, ESQ.  
CURATOR OF THE ZOOLOGICAL SOCIETY OF LONDON, ETC. ETC.

LONDON:  
SMITH, ELDER AND CO. 65, CORNHILL.  
MDCCCXXXIX.



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\* The palatine foramina are accidentally omitted—see description.



# ERRATA FOR PART—"MAMMALIA."

Page 75, line 22, for "Symidon" read "Sigmodon."

92, insert above the words "DASYPUS HYBRIDUS" the words "ORDER—EDENTATA."

93, insert above the words "DIDELPHIS AZARÆ," the words "ORDER—MARSUPIALIA."

94, in the dimensions of "Didelphis Crassicaudata" read "Length from nose to root of tail, 11 in. 3 lines," instead of "1 in. 3 lines."

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# INDEX TO THE SPECIES.

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## GEOGRAPHICAL INTRODUCTION.

BY MR. DARWIN.

THE object of the present Introduction, is briefly to describe the principal localities, from which the Zoological specimens, collected during the voyage of the Beagle, were obtained. At the conclusion of this work, after each species has been separately examined and described, it will be more advantageous to incorporate any general remarks. The Beagle was employed for nearly five years out of England; of this time a very large proportion was spent in surveying the coasts of the Southern part of South America, and of the remainder, much was consumed in making long passages during her circumnavigation of the globe. Hence nearly the entire collection, especially of the animals belonging to the higher orders, was procured from this continent; to which, however, must be added the Galapagos Archipelago, a group of islands in the Pacific, but not far distant from the American coast. The localities may be briefly described under the following heads.

BRAZIL. This country presents an enormous area, supporting the most luxuriant productions of the intertropical regions. It is composed of primary formations, and may be considered as being hilly rather than mountainous. LA PLATA includes the several provinces bordering that great river;—namely, Buenos Ayres, Banda Oriental, Santa Fé, Entre Rios, &c. My collections were chiefly made at BUENOS AYRES, at MONTE VIDEO, the capital of Banda Oriental, and at MALDONADO, a town in the same province, situated on the northern

a



shore, near the mouth of the estuary of the Plata. These countries consist either of an undulating surface, clothed with turf, or of perfectly level plains with enormous beds of thistles. Except on the banks of the rivers, trees nowhere grow; there are, however, thickets in some of the valleys, in the more hilly parts of Banda Oriental. During the winter and spring of this hemisphere, a considerable quantity of rain falls, and the plains of turf are then everywhere verdant; but in summer the country assumes a brown and parched appearance.

BAHIA BLANCA forms a large bay, in latitude  $39^{\circ}$  S. on a part of the coast, which falls within the territory of the province of Buenos Ayres, but which from its physical conditions would more properly be classed with Patagonia. The tertiary plains of PATAGONIA, extend from the Strait of Magellan to the Rio Negro, which is commonly assumed as their Northern boundary. This space of more than seven hundred miles in length, and in breadth reaching from the Cordillera to the Atlantic Ocean, is everywhere characterised by the dreary uniformity of its landscape. Nearly desert plains, composed of a thick bed of shingle, and often strewed over with sea-shells, (plainly indicating that the land has been covered within a recent period by the sea,) are but rarely interrupted by hills of porphyry, and other crystalline rocks. The plains support scattered tufts of wiry grass, and stunted bushes; whilst in the broad flat-bottomed valleys, dwarf thorn-bearing trees, barely ornamented with the scantiest foliage, sometimes unite into thickets; and here the few feathered inhabitants of these sterile regions resort. There is an extreme scarcity of water; and where it is found, especially if in lakes, it is generally as salt as brine. The sky in summer is cloudless, and the heat in consequence, considerable; whereas the frosts of winter are, sometimes, severe. The principal localities visited by the Beagle, were the RIO NEGRO, in latitude  $41^{\circ}$  S., PORT DESIRE, PORT ST. JULIAN, and SANTA CRUZ. At the latter place, a party, under the command of Captain FitzRoy, followed up the river in boats, to within a few miles of the Cordillera; and an opportunity was thus afforded of verifying the nature of the country in its entire breadth. At the Rio Negro the plains are much more thickly covered with bushes, (chiefly acacias,) than in any other part of Patagonia.

TIERRA DEL FUEGO may be supposed to include all the broken land south of a line joining the opposite mouths of the Strait of Magellan. The land is moun-

tainous, and may be aptly compared to a lofty chain, partly submerged in the sea;—bays and channels occupying the position of valleys. The Eastern side almost exclusively consists of clay-slate; the Western, of primary, and various plutonic formations. The mountains, from the water's edge, to within a short distance of the lower limit of perpetual snow, are everywhere (excepting on the exposed western shores) concealed by an impervious forest, the trees of which do not periodically shed their leaves. On the East coast, the outline of the land shows that tertiary formations, like those of Patagonia, extend south of the Strait of Magellan; but with the exception of this part, it is rare to find even a small space of level ground; and where such occurs, a thick bed of peat invariably covers the surface. The climate is of that kind which has been denominated insular: the winters are far from being excessively cold, whilst the summers are gloomy, boisterous, and seldom cheered by the rays of the sun. In all seasons, a large quantity of rain falls. Hence, from the physical conditions of Tierra del Fuego, all the land animals must live either on the sea beach, (and in this class the Aborigines may be included) or within the humid and entangled forests.

The FALKLAND ISLANDS are situated in the same latitude as the Eastern entrance of the Strait of Magellan, and about 270 miles East of it. The climate is nearly the same as in Tierra del Fuego, but the surface of the land, instead of being as there, concealed by one great forest, does not support a single tree. We see on every side a withered and coarse herbage, with a few low bushes, which spring from the peaty soil of an undulating moorland. Scattered hills, and a central range of quartz rock, protrude through formations of clay-slate and sand-stone (belonging to the Silurian epoch,) which compose the lower country.

The structure of the west coast of South America, from the Strait of Magellan northward to latitude  $38^{\circ}$ , in its greater part, (as far north as Chiloe) is very similar to that of Tierra del Fuego. The climate likewise is similar,—being gloomy, boisterous, and extremely humid; and, consequently, the land is concealed by an almost impenetrable forest. In the northern part of this region, the temperature of course is considerably higher than near the Strait of Magellan; but nevertheless it is much less so, than might have been anticipated from so



great a change in latitude. Hence, although the vegetation of this northern district presents a marked difference when compared with that of the southern; yet the zoology in many respects has, like the general aspect of the landscape, a very uniform character. The specimens were chiefly collected from the PENINSULA OF TRES MONTES, the CHONOS ARCHIPELAGO (from latitude  $46^{\circ}$  to  $43^{\circ} 30'$ ), CHILOE with the adjoining islets, and VALDIVIA. The contrast between the physical conditions and productions of the East and West coasts of this part of South America is very remarkable. On one side of the Cordillera, great heavy clouds are driven along by the western gales in unbroken sheets, and the indented land is clothed with thick forests; whilst on the other side of this great range, a bright sky, with a clear and dry atmosphere, extends over wide and desolate plains.

CHILE in the neighbourhood of CONCEPCION (latitude  $36^{\circ} 42' S.$ ) may be called a fertile land; for it is diversified with fine woods, pasturage, and cultivated fields. But towards the more central districts (near VALPARAISO and SANTIAGO) although by the aid of irrigation, the soil in the valleys yields a most abundant return, yet the appearance of the hills, thinly scattered with various kinds of bushes and cylindrical Opuntias, bespeaks an arid climate. In winter, rain is copious, but during a long summer of from six to eight months, a shower never moistens the parched soil. The country has a very alpine character, and is traversed by several chains of mountains extending parallel to the Andes. These ranges include between them level basins, which appear once to have formed the beds of ancient channels and bays, such as those now intersecting the land further to the south. North of the neighbourhood of Valparaiso, the climate rapidly becomes more and more arid, and the land in proportion desert. Beyond the valley of COQUIMBO (latitude  $30^{\circ}$ .) it is scarcely habitable, excepting in the valleys of Guasco, Copiapó, and Pajón, which owe their entire fertility to the system of irrigation, invented by the aboriginal Indians and followed by the Spanish colonists. Northward of these places, the absolute desert of Atacama forms a complete barrier, and eastward, the snow-clad chain of the Cordillera separates the Zoological province of Chile, from that of the wide plains which extend on the other side of the Andes.

The last district which it is at all necessary for me to mention here, is that

of the GALAPAGOS ARCHIPELAGO, situated under the Equator, and between five and six hundred miles West of the coast of America. These islands are entirely volcanic in their composition; and on two of them the volcanic forces have within late years been seen in activity. There are five principal islands, and several smaller ones: they cover a space of  $2^{\circ} 10'$  in latitude, and  $2^{\circ} 35'$  in longitude. The climate, for an equatorial region, is far from being excessively hot: it is extremely dry; and although the sky is often clouded, rain seldom falls, excepting during one short season, and then its quantity is variable. Hence, in the lower part of these islands, even the more ancient streams of lava (the recent ones still remaining naked and glossy) are clothed only with thin and nearly leafless bushes. At an elevation of 1200 feet, and upwards, the land receives the moisture condensed from the clouds, which are drifted by the trade wind over this part of the ocean at an inconsiderable height. In consequence of this, the upper and central part of each island supports a green and thriving vegetation; but from some cause, not very easily explained, it is much less frequented, than the lower and rocky districts are, by the feathered inhabitants of this archipelago.

By a reference to the localities here described, it is hoped that the reader will obtain some general idea of the nature of the different countries inhabited by the several animals, which will be described in the following sheets.

The vertebrate animals in my collection have been presented to the following museums: — the Mammalia and Birds to the Zoological Society; the Fishes to the Cambridge Philosophical Society; and the Reptiles, when described, will be deposited in the British Museum. For the care and preservation of all these and other specimens, during the long interval of time between their arrival in this country and my return, I am deeply indebted to the kindness of the Rev. Professor Henslow of Cambridge. With respect to the gentlemen, who have undertaken the several departments of this publication, I hope they will permit me here to express the great personal obligation which I feel towards them, and likewise my admiration at the disinterested zeal which has induced them thus to bestow their time and talents for the good of Science.



MAMMALIA.

FAMILY—PHYLLOSTOMIDÆ.

DESMODUS D'ORBIGNYI.

PLATE I. Natural size. Skull, teeth, &c. Pl. XXXV., figs. 1.

*D. pilis nitidis adpressis; corpore suprâ fusco, pilis ad basin albis; gulâ abdomineque cinerescenti-albis; nasûs prosthernate parvulo bifido.*

DESCRIPTION.—The fur of this Bat is glossy and has a silk-like appearance; that on the top of the head, sides of the face, and the whole of the upper parts of the body, is of a deep brown colour; all the hairs on these parts, however, are white at the base. The flanks, interfemoral membrane, and the arms, are also covered on their upper side with brown hairs. On the lower part of the sides of the face, and the whole of the under parts of the body, the hairs are of an ashy-white colour. The membrane of the wing is brownish. The ears are of moderate size, and somewhat pointed; externally they are covered with minute brown hairs, and internally with white. The tragus is also covered with white hairs; it is of a narrow form, pointed at the tip, and has a small acute process in the middle of the outer margin. The nose-leaf is pierced by the nostrils, which diverge posteriorly, and is so deeply cleft on its hinder margin, that it may be compared to two small leaflets joined side by side near their bases. These leaflets, unlike the nose-leaf of the Phyllostomina, lie horizontally on the nose to which they are attached throughout, a slight ridge only indicating their margin. Around the posterior part of the nose-leaf there is a considerable naked space, in which two small hollows are observable, situated one on each side, and close to the



nose-leaf; and, at a short distance behind the nose-leaf, this naked membrane is slightly elevated, and forms a transverse fleshy tubercle.

	In.	Lines.		In.	Lines.
Length of head and body . . .	3	3	Length of tarsus (claw included) . . .	0	8½
interfemoral membrane . . .	0	3½	ear . . . . .	0	4
the antibrachium . . . . .	2	2	tragus . . . . .	0	3
thumb (claw included) . . . . .	0	8	nose-leaf . . . . .	0	2½
tibia . . . . .	0	10	Expanse of the wings . . . . .	12	8

Habitat, Coquimbo, Chile. (*May.*)

"The Vampire Bat," says Mr. Darwin in his MS. notes upon the present species, "is often the cause of much trouble, by biting the horses on their withers. The injury is generally not so much owing to the loss of blood, as to the inflammation which the pressure of the saddle afterwards produces. The whole circumstance has lately been doubted in England; I was therefore fortunate in being present when one was actually caught on a horse's back. We were bivouacking late one evening near Coquimbo, in Chile, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured the Vampire. In the morning, the spot where the bite had been inflicted was easily distinguished from being slightly swollen and bloody. The third day afterwards we rode the horse, without any ill effects.

Before the introduction of the domesticated quadrupeds, this Vampire Bat probably preyed on the guanaco, or vicugna, for these, together with the puma, and man, were the only terrestrial mammalia of large size, which formerly inhabited the northern part of Chile. This species must be unknown, or very uncommon in Central Chile, since Molina, who lived in that part, says (*Compendio de la Historia del Reyno de Chile*, vol. i. p. 301,) "that no blood-sucking species is found in this province."

It is interesting to find that the structure of this animal is in perfect accordance with the habits as above detailed by Mr. Darwin. Among other points, the total absence of true molars, and consequent want of the power of masticating food, is the most remarkable. On the other hand we find the canines and incisors perfectly fitted for inflicting a wound such as described, while the small size of the interfemoral membrane (giving freedom to the motions of the legs,) together with the unusually large size of the thumb and claw, would enable this Bat, as I should imagine, to fix itself with great security to the body of the horse.

I have named this species after M. d'Orbigny, who has added so much to

our information on the zoological productions of South America. The *Edostoma cinerea*\* of that author has evidently a close affinity to the animal here described, and differs chiefly (judging from the drawing published in his work) in the larger size of the ears, in having the nose-leaf free, and the surrounding membrane free and elevated.

As M. d'Orbigny has not yet published the character of his genus *Edostoma*, his figure is my only guide, and in this figure I find the dentition agreeing both with that of the present species, and that of the genus *Desmodus* of Prince Maximilian,—as would appear from the published descriptions, and figure given by M. de Blainville†.—The points of distinction between M. d'Orbigny's animal and the species here described, are not, in my opinion, of sufficient importance to constitute generic characters, I have, therefore, retained the name of *Desmodus*.

It is desirable perhaps to separate the Blood-sucking Bats from the Insectivorous species, and place them between the latter group and the *Pteropina*, (with which they agree in the large size of the thumb and the rudimentary interfemoral membrane,) under a sectional name, which I propose to call *Hæmatophilini*.

# 1. PHYLLOSTOMA GRAYI.

## PLATE II.

*P. fusco-cinereum*; *nasus prosthernate lanceolato*; *auribus mediocribus, trago basin versus extus unidentato*; *caudâ gracillimâ, brevi, et membranâ interfemorali inclusâ*; *verrucâ complanatâ ad apicem menti, verrucis parvulis circumdatâ*.

DESCRIPTION.—This *Phyllostoma* agrees with the species described by Mr. J. Gray‡ under the name of *Childreni*, in having on the lower lip "an half ovate group of crowded warts," but is of a much smaller size, and differs also in colour.

The number of teeth are as follows:—incisors 4; canines 2; molars  $\frac{5-5}{5-5}=32$ . The intermediate pair of incisors of the upper jaw are large, compressed, and have their apices rounded; the lateral pair are so minute, that they are scarcely visible without the assistance of a lens: the four incisors of the

\* Voy. Amer. Merid. t. 8.

† See his memoir "Sur quelques anomalies du système dentaire dans les mammifères," published in the *Annales Françaises et Etrangères d'Anatomie et de Physiologie*, No. 6, pl. IX. fig. 2.

‡ Magazine of Zoology and Botany, No. 12.



lower jaw, are somewhat crowded, the intermediate pair are slightly larger than the lateral; they are all deeply notched, and broad at the apex. The cerebral portion of the skull is much arched and the anterior portion is depressed. The zygomatic arch is imperfect; see Pl. 35. figs. 2. The nose-leaf is lanceolate, and of moderate size: the ears are also of moderate size; they are rounded at the tip and emarginated on their exterior edge: the tragus is elongated, and suddenly attenuated towards the apex; the outer margin is deeply notched towards the base, and very obscurely crenulated above this notch. The interfemoral membrane is of moderate extent, and emarginated posteriorly. The tail, which is very slender, is entirely enclosed by the interfemoral membrane, and the visible portion appears to consist of but two joints, which together, measure about two and a half lines in length. The basal half of the thumb is enclosed in membrane. The fur is soft and rather long. The general tint of the upper and under parts of the body is brownish-ash; the hairs on the neck and on the whole of the back are grey at the base, then white, or nearly so, brownish-ash near the tip, and whitish at the tip. On the belly the hairs are nearly of an uniform brown-ash colour, their apices only being whitish. The ears, nose-leaf, and membrane of the wings, are of a sooty-black hue.

	In.	Lines.		In.	Lines.
Length of head and body . . . . .	2	0	Length of ear . . . . .	0	7
antibrachium . . . . .	1	4 $\frac{1}{2}$	nose-leaf . . . . .	0	3 $\frac{1}{2}$
thumb (claw included) . . . . .	0	5 $\frac{1}{2}$	Expanse of the wings . . . . .	10	0
tibia . . . . .	0	7			

Habitat, Pernambuco, Brazil. (*August.*)

"This species appeared to be common at Pernambuco (five degrees north of Bahia). Upon entering an old lime-kiln in the middle of the day, I disturbed a considerable number of them: they did not seem to be much incommoded by the light, and their habitation was much less dark than that usually frequented as a sleeping place by these animals." D.

I have named this species after Mr. John Gray, the author of several extensive memoirs on the order to which it belongs, and to whom I am indebted for valuable assistance whilst comparing this and other species with those contained in the collection of the British Museum.

## 2. PHYLLOSTOMA PERSPICILLATUM.

I find in Mr. Darwin's collection, a bat agreeing with the description of M.

Geoffroy Saint Hilaire,\* under the above name, with the exception of a slight difference in the dimensions; I will, therefore, add those of the present specimen, which is a female. It may be observed, that in the animal before me, the tragus of the ear is pointed, and not bifid at the apex, as represented in plate xi of the work quoted.

	In.	Lines.		In.	Lines.
Length of head and body . . . . .	4	0	Length of tragus . . . . .	0	3
antibrachium . . . . .	2	7	tibia . . . . .	1	0
nose-leaf . . . . .	0	5	Expansion of the wings . . . . .	16	8
ear . . . . .	0	8 $\frac{1}{2}$			

"This bat was caught at Bahia, (latitude 13° S.) on the coast of Brazil, in consequence of its having flown into a room where there was a light. I scarcely ever saw an animal so tenacious of life." D.

## FAMILY—VESPERTILIONIDÆ.

### VESPERTILIO CHILOENSIS.

#### PLATE III.

*V. fuscus*: auribus mediocribus; trago elongato, angusto, apicem versus attenuato; fronte concavo; rostro obtuso; caudâ ad apicem extremum liberâ.

DESCRIPTION.—In size and colouring, this Bat very closely resembles the *Vespertilio Pipistrellus* of Europe; the wings, however, are considerably broader in proportion; the antibrachium, tibia, and tail, are each of them longer; the tragus of the ear is also longer, and narrower.

The muzzle is short and obtuse, and furnished on each side with numerous hairs, which, when compared with those of other parts, are of a more harsh nature. The nose is naked at the apex. The forehead is concave. The ears are narrow, and somewhat pointed, emarginated externally, and have about four transverse rugæ: the tragus is elongated, narrow, and pointed, and has the outer margin very obscurely crenulated. On the chin there is a small wart, from which spring several stiffish hairs. The tail is about equal to the body in length, and has the extreme tip free. The fur is moderately

\* "Annales des Muséum d'Histoire Naturelle," tom. xv. p. 176.



long, and of an uniform rich brown colour, and extends on to the base of the interfemoral membrane above and below; the remainder of this membrane is bare, and, together with that of the wings, of a black colour.

	In.	Lines.		In.	Lines.
Length of the head and body	1	8	Length of the tragus	0	3½
the tail	1	3½	the antibrachium	1	5½
Expanse of the wings	8	3	the thumb (claw included)	0	2½
Length of the ear	0	5½	the tibia	0	6¾

Habitat, Chiloe. (*January.*)

"This specimen was given me by Lieut. Sullivan, who obtained it amongst the islets on the Eastern side of Chiloe. It is not, I believe, common, nor do the humid and impervious forests of that island appear a congenial habitation for members of this family. It must, however, be observed, that even in Tierra del Fuego, where the climate is still less hospitable, and where the number of insects is surprisingly small, I saw one of these animals on the wing." D.

#### FAMILY—NOCTILIONIDÆ.

##### DYSOPES NASUTUS.

*Molossus nasutus* *Spix*, *Simiarum et Vespertilionum. Brasiliensium species novæ. Nyctinomus Brasiliensis.*—*Geoffroy*, *Annales des Sciences Naturelles*, tom. i. p. 337. pl. 22.

Of this species I find three specimens in Mr. Darwin's collection—"It is remarkable," says Mr. Darwin, "for its wide geographical range. I obtained specimens at Maldonado, on the northern bank of the Plata, where it was exceedingly numerous in the attics of old houses, and likewise at Valparaiso in Chile. Molina (vol. i. p. 301.) says another species is found in Chile, of the same size and figure, but of a more orange (*naranjado*) colour."

Upon comparing the dimensions of several specimens of this species with those given by Temminck in his "Monographie sur le Genre Molosse," I find that they vary very considerably; I shall therefore be adding some little to the history of the species, by giving the dimensions of those now before me, together with the sexes of the specimens measured, and their localities. In all these specimens there is a series of pointed tubercles along the upper margin of the ears, a character which M. Temminck has omitted to notice. They vary slightly

in the intensity of their colouring, but among those brought from Chile I do not perceive any agreeing with that species, or variety, mentioned by Molina as approaching to an orange colour. All the specimens whose dimensions are here given, are preserved in spirit. Two of them are from Maldonado brought by Mr. Darwin; three were collected in Hayti by Mr. J. Hearne, and one is from Chile, whence it was brought by Mr. H. Cuming.

	From Chile.	Hayti.	Hayti.	Hayti.	Maldonado.	Maldonado.
	♀	♀	♂	♂	♀	♀
	In. Lines.	In. Lines.	In. Lines.	In. Lines.	In. Lines.	In. Lines.
Length of head and body	2 3	1 11	2 0	2 0½	2 6	2 6
of tail	1 1½	1 2	1 2	1 1½	1 1	1 2
of free portion of ditto	0 6½	0 5	0 6½	0 5½	0 8¾	0 8½
Expanse of wings	10 3	9 3	9 8	9 0	10 6	10 2
Length of antibrachium	1 7	1 6	1 6½	1 6	1 8	1 9
of ears	0 5	0 4½	0 4¾	0 4½	0 5½	0 5½
Width of ditto	0 7	0 6	0 6	0 6	0 7	0 7
Length from nose to eye	0 3½	0 3	0 3¾	0 3	0 3½	0 3½

In all the specimens examined by me, there are two incisors in the upper jaw, and four in the lower, they would therefore, according to M. Temminck, be adult.

#### FAMILY—CARNIVORA.

##### 1. CANIS ANTARCTICUS.

###### PLATE IV.

Antarctic Wolf, *Pennant*, *History of Quadrupeds*, vol. i. p. 257. sp. 165.

*Canis Antarcticus*, *Shaw*, *Gen. Zool.* vol. i. pt. 2. p. 331.

—, *Desm.* *Mamm.* p. 199.

*C. supra sordidè fulvescenti-brunneus, pilis ad apicem nigris; lateribus, corporeque subtus, sordidè flavescanti-fuscis; capite, auribusque extus, fusco nigroque adspersis; artubus flavescanti-fulvis; labiis, guld, abdomine imo, femoribusque intus, sordidè albis; caudâ ad basin concolore cum corpore, dein nigrâ, apice albo.*

DESCRIPTION.—This animal is considerably larger than the common fox, (*Canis Vulpes*, Auct.) and stouter in its proportions, and, in fact, appears to be intermediate between the ordinary foxes and the wolves. The tail is much



smaller and less bushy than in the former animals. The contour of the head is wolf-like; the legs, however, are shorter than in the true wolves; and the tail is white at the apex, a character common in the foxes.

The fur of the Antarctic Fox is moderately long, and the under fur is not very abundant, especially as compared with that of the *C. magellanicus*. This under fur is of a pale brown colour; the apical portion of each hair is yellowish; the longer hairs are black at the apex, brown at the base, and annulated with white towards the apex. In many of these hairs the subapical pale ring is wanting. On the chest and belly the hairs are of a pale dirty yellow colour, gray-white at the base, and black at the apex. On the hinder part of the belly the hairs are almost of an uniform dirty white. The space around the angle of the mouth, the upper lip, and the whole of the throat, are white. The chin is brown-white, or brownish. The basal half of the tail is of the same colour as the body, and the hairs are of the same texture; on the apical half of the tail they are of a harsher or less woolly nature, of a black colour at the apex, and brownish at the base; those at the extreme point are totally white. The legs are almost of an uniform fulvous colour; the feet are of a somewhat paler hue; the hairs on the under side of the hinder feet are brownish, and the external and posterior parts of the tibiæ are suffused with the same tint. The hairs on the head are grizzled with black and fulvous; the former of these colours is somewhat conspicuous, excepting in the region of the eyes, where the fulvous or yellowish tint prevails. The muzzle is scarcely of so dark a hue as the crown of the head. The ears are furnished internally with long white hairs, externally the hairs are yellowish, with their apices black; the latter colour is more conspicuous towards the tip of the ear. The sides of the neck near the ear are of a rich fulvous hue.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	36	0	Length of ear . . . . .	2	9
from tip of nose to ear . . . . .	7	3	Height of body at shoulders . . . . .	15	0
of tail (hair included) . . . . .	13	0			

Habitat, Falkland Islands.

"Three specimens of this animal were brought to England by Capt. FitzRoy; from one of which, the above drawing and description has been made. The earliest notice I can find of this animal is by Pernety,\* during Bougainville's voyage, which was undertaken in 1764, for the purpose of colonizing these islands. The strange familiarity of its manner seems to have excited the fears of some of

\* Journal Historique d'un Voyage fait aux Iles Malouines, tom. ii. p. 459.

the seamen in Commodore Byron's voyage (in 1765) in rather a ludicrous manner. Byron says that seals were not the only dangerous animals that they found, "for the master having been sent out one day to sound the coast upon the south shore, reported at his return that four creatures of great fierceness, resembling wolves, ran up to their bellies in the water to attack the people in his boat, and that as they happened to have no fire-arms with them, they had immediately put the boat off in deep water." Byron adds that, "When any of these creatures got sight of our people, though at ever so great a distance, they ran directly at them; and no less than five of them were killed this day. They were always called wolves by the ship's company, but, except in their size, and the shape of the tail, I think they bore a greater resemblance to a fox. They are as big as a middle-sized mastiff, and their fangs are remarkably long and sharp. There are great numbers of them upon this coast, though it is not perhaps easy to guess how they first came hither; for these islands are at least one hundred leagues distant from the main. They burrow in the ground like a fox, and we have frequently seen pieces of seals which they have mangled, and the skins of penguins lie scattered about the mouths of their holes. To get rid of these creatures, our people set fire to the grass, so that the country was in a blaze as far as the eye could reach, for several days, and we could see them running in great numbers to seek other quarters."

The habits of these animals remain nearly the same to the present day, although their numbers have been greatly decreased by the singular facility with which they are destroyed. I was assured by several of the Spanish countrymen, who are employed in hunting the cattle which have run wild on these islands, that they have repeatedly killed them by means of a knife held in one hand, and a piece of meat to tempt them to approach, in the other. They range over the whole island, but perhaps are most numerous near the coast; in the inland parts they must subsist almost exclusively on the upland geese, (*Anser leucopterus*,) which, from fear of them, like the eider-ducks of Iceland, build only on the small outlying islets. These wolves do not go in packs; they wander about by day, but more commonly in the evening; they burrow holes; are generally very silent, excepting during the breeding season, when they utter cries, which were described to me as resembling those of the *Canis Azaræ*. Spaniards and half-cast Indians, from several districts of the southern portions of South America, have visited these islands, and they all declare that the wolf is not found on the mainland; the sealers likewise say it does not occur on Georgia, Sandwich Land, or the other islands in the Antarctic ocean. I entertain, therefore, no doubt, that the *Canis antarcticus* is peculiar to this archipelago. It is found both on East and West Falkland, as might have been inferred from the accounts given by Bougainville and Byron, who visited different islands;—I state this particularly, because the contrary has been asserted. I was



assured by Mr. Low, an intelligent sealer, who has long frequented these islands, that the wolves of West Falkland are invariably smaller and of a redder colour than those from the Eastern island; and this account was corroborated by the officers of the Adventure, employed in surveying the archipelago. Mr. Gray, of the British Museum, had the kindness to compare in my presence the specimens deposited there by Captain Fitzroy, but he could not detect any essential difference between them. The number of these animals during the last fifty years must have been greatly reduced; already they are entirely banished from that half of East Falkland which lies East of the head of St. Salvador Bay and Berkeley Sound; and it cannot, I think, be doubted, that as these islands are now becoming colonized, before the paper is decayed on which this animal has been figured, it will be ranked amongst those species which have perished from the face of the earth."—D.

## 2. CANIS MAGELLANICUS.

PLATE V.

*Canis Magellanicus*, Gray, Proceedings of the Zoological Society of London, part iv. 1836, p. 88.  
*Vulpes Magellanica*, Gray, Magazine of Natural History, New Series, 1837, vol. i. p. 578.

*C. suprà albo nigroque variegatus; lateribus fulvescente fuscoque lavatis; capite fusco-flavo et albescente adperso; rostro supernè obscuriore; auribus, artubusque extùs flavescenti-rufis; corpore subtùs sordidè flavescenti-albo; pectore fulvo lavato; mento fuscescente; caudà fulvescenti-fusca, pilis ad apicem nigris, subtùs pallidiore; plagà supernè prope basin caudæ, hujusque apice nigris.*

DESCRIPTION.—This species is considerably larger than the European fox; its form is more bulky, the limbs are shorter and stouter in proportion, the ears are smaller and the tail is more bushy. The fur is long, thick, and loose. The under fur is very long, abundant, and of a woolly texture. The back is mottled with black and white, the former of these colours being predominant; the hairs on this part are gray at the base, there is then a considerable space of a pale, or whitish brown colour; next follows a broad white ring, beyond which the hairs are black. On the sides of the body the hairs are coloured in the same way, excepting that the white portion is more extended, and is followed by a rich yellow-brown, shaded into black as it approaches the apex of each hair. Hence the general hue of the sides of the body is paler than that of the back, the brown and white tints being the more conspicuous.

The hairs of the head are annulated with white, and fulvous, and are black at the tip; the two former colours are most conspicuous. The chin is brownish. The lower part of the cheeks, the throat, and the under parts of the body, are of a dirty yellowish white colour, inclining to buff in certain parts, especially on the lower part of the neck and chest. The limbs are of a rich deep fulvous, or yellowish rust colour externally; the feet and inner sides of the legs are of a paler hue. On the hinder legs externally, above the heel, is a patch of bright rust colour; such is also the colour of the ears externally, and likewise of that portion of the neck behind the ears. Internally the ears are furnished with long yellowish white hairs. The tail is long and very bushy; at its base the hairs are rusty white, towards the middle they are of a paleish rust colour, and at the apex they are black; there is also a black patch on the upper part towards the base. The hairs of the tail beneath are almost entirely of an uniform rusty white colour, those on the upper side are all tipped with black.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	31	0	Length of ear . . . . .	2	0
to base of ear . . . . .	6	9	Height of body at the shoulders . . .	14	6
of tail (hair included) . . . . .	17	0			

Habitat, Chile. (*June.*)

"This animal was first brought to Europe by Captain Philip P. King, who obtained it at Port Famine in Tierra del Fuego, where it is common. My specimen was obtained in the valley of Copiapó in the northern part of Chile. The Magellanic fox, therefore, has a range on the western coast of at least 1600 miles, from the humid and entangled forests of Tierra del Fuego, to the almost absolutely desert country of northern Chile. In La Plata, on the Atlantic side of the continent, I believe it is not found.\* It is mentioned by Molina in his account of the animals of Chile,† under the name of Culpeu, which he supposes to be derived from the Indian word "culpem," signifying madness; for this animal, when it sees a man, runs towards him, and standing at the distance of a few yards, looks at him attentively. He adds, although great numbers are killed, they do not leave off this habit. Molina states that he has repeatedly been a witness of this, and I received nearly similar accounts from several of the inhabitants of Chile: yet I must observe, that the people of the farm-house, where my specimen was killed

\* Azara has not described this animal, which circumstance alone would render it probable that it is not an inhabitant of Paraguay or La Plata. The two Foxes mentioned by him are the Aguará-guaza, (*Canis jubatus*, Auct.) a very large kind of fox (a strangely exaggerated description of this animal is given by Falkner) of which I could not obtain a specimen; and the Aguará-chay, or *Canis Azara*.

† Molina, Compendio de la Historia del Reyno de Chile, vol. i. p. 330 and 332.



(after it, together with its female, had destroyed nearly two hundred fowls) bitterly complained of its craftiness. From this bold curiosity in the disposition of the Culpeu, Molina thought that it was the same animal as that described by Byron at the Falkland Islands, but we now know that they are different. The Culpeu burrows holes under ground, often wanders about by day, is very strong and fleet. When riding one day in the valley of Copiapó, accompanied by a half-bred greyhound, I happened to come across one of these foxes; and although the ground was, in the first part of the chase, level, it soon entirely distanced its pursuer. Whilst running, it barked so like a dog, that until it had run some way a-head of the greyhound, I could not tell from which animal the noise proceeded. After the Culpeu had reached the mountains, it made a sudden bend from its course, and returned in a nearly parallel line, but at the base of a steep cliff of rock; it then quietly seated itself on its haunches, and seemed to listen with much satisfaction to the dog, which was running the scent on the mountain side, above its head."—D.

## 3. CANIS FULVIPES.

## PLATE VI.

*Canis fulvipes*, *Martin*, Proceedings of the Zoological Society of London, 1837, p. 11.

*C. suprà niger, albo adpersus, capite lateribusque fuscis, sordidè albo nigroque adpersis; rostro superiore, mentoque fusco-nigricantibus; gula, labiis superioribus, femoribusque ad partem anteriorem, sordidè albis; pectore abdomineque fuscescentibus; auribus externè rufo-castaneis; brachiis internè, tarsis, digitisque fuscescenti-fulvis; artubus posticis extùs supra calcem fusco-nigrescentibus; caudæ colore ad basin ut in corpore, apice nigro.*

DESCRIPTION.—This species is considerably less than the common European fox, (*Canis Vulpes*, Auct.) its weight probably would scarcely exceed half that of the latter animal. The form of the body is stout, the limbs are short and rather slender; the head is also short, and the muzzle is pointed; the ears are of moderate size. The tail is about equal to half the whole length of the body, head included; and compared with that of ordinary foxes, is much less bushy, especially at the base. The general hue of this animal is very dark; the fur is rather short, and harsh to the touch; the under fur is abundant, and of a woolly texture. On the back, all the hairs are of a deep brown colour, annulated with white near the apex, and black at the apex. When the fur is

in its ordinary position, the brown colour is not seen, and the black and white produce a grizzled appearance; the black colour, however, predominates. On the sides of the body each hair is grayish at the base, then pale brown, near the apex annulated with white, and at the apex black: the three last mentioned colours are exhibited in about equal proportions (the fur being in its natural position) over the haunches and shoulders, but between these two parts, the brown and white colours are the more conspicuous. The hairs of the head are coloured in the same way as those of the sides of the body, excepting that the brown portion of each hair, is replaced by rusty brown, which gives a rufous hue to this part. The muzzle and chin are of a sooty brown colour. A dirty white patch is observable on each side of the muzzle at the apex, and this colour is extended along the margin of the upper lip on to the lower part of the cheeks, and over the whole of the throat; all the hairs in these parts (with the exception of those on the lips) being of a deep brownish gray colour, with their apical portions only, white. The ears are covered internally with long yellowish white hairs; towards, and on the margin of the ears externally, the hairs are of a buff colour, on the remaining portion of the ears, and on the sides of the neck, they are of a reddish chestnut hue. The hairs of the under parts of the body are brown, those near the hinder legs, and between them, are of a dirty white colour at the apex; towards the rump they are of a yellowish brown colour. The hairs of the tail are brown, black at the apex, and annulated with white near the apex; on the apical portion the hairs are black, and brown at the base. The fore legs are of a brown colour externally, internally they are of a brownish fulvous hue; such is also the colour of the feet. The fore part of the posterior legs is whitish, and there is a large blackish patch on the outer side, and extending around the posterior part, above the heel.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	24	0	Length of ear . . . . .	2	3½
to base of ear . . . . .	0	4¾	Height of body at shoulders . . . . .	10	6
of tail (hair included) . . . . .	10	0			

Habitat, Chiloe. (*December*.)

"I killed this animal on the sea-beach, at the southern point of the island; it is considered extremely rare in the northern and inhabited districts. Molina mentions this fox, which he falsely considered as the *C. lagopus*, under the name of the *Payne Gurú*, and he adds, that in the Archipelago of Chiloe, it is found of a black colour. From this circumstance I am induced to believe that the species is confined to these islands."—D.



## 4. CANIS AZARÆ.

## PLATE VII.

Canis Azaræ, Pr. Maximilian, Beiträge zur Naturgeschichte Braziliens, vol. ii. p. 338.

Agouarachay, Azara, Essais sur l'histoire naturelle des Quadrupèdes de la Province du Paraguay, tom. i. p. 317.

*C. suprà albo nigroque variegatus; lateribus cinerescens; capite, auribus externè, artubusque, cinereo-cinnamominis; mento nigro; tibiis externis ad basin nigro lavatis; caudâ albescente, suprà nigro variegatâ, ad apicem nigrâ; spatio pone angulos oris, gutture, corporeque subtus albescentibus; fasciis duabus grisescentibus in pectore plus minusve distinctis.*

DESCRIPTION.—Compared with the common fox (*Canis Vulpes*, Auct.), the present animal is rather smaller, and of a more slender form. Its limbs are a little longer in proportion; the ears are not so broad. The tail is not quite so bushy, neither is it so long; the fur is much longer, and of a harsher nature.

The predominant colours of the body are black and white; the limbs are of a fulvous hue externally. The hairs on the under part of the feet are dirty brown; the fore part of the anterior legs, and the feet, are of a buff colour; on the former, the hairs are more or less distinctly tipped with black, which produces a grizzled appearance. The inner side of the fore legs is of an uniform pale buff colour; the hinder part of these legs, the fore part of the posterior legs, and the inner side of the thighs, are white. On the outer side of the hinder legs, at some little distance above the heel, is a large blackish patch. The under parts of the body are of a dirty white hue, arising from the hairs being dusky or brownish at the base, and tipped with white, as on the fore part of the belly, or of a pale buff colour at the base, as towards the rump. The edge of the upper lip, the throat, neck, and chest, are white; a broad grayish band extends across the latter, and another of a paler hue crosses the lower part of the neck. The chin is black, and this colour is extended backwards around the angle of the mouth. The upper part of the head is of a pale yellow-brown colour, each hair being annulated with white near the apex. The ears are furnished with white hairs internally, and externally they are of a yellowish brown colour, tipped with black; at the base of the ears, and the portion of the neck on each side nearest to them, the

hairs are of an uniform buff colour. The hairs of the moustaches are long and stiff, and of a black colour. The hairs of the back, which are very long, are brown at the base, very pale towards the skin, and of a deep brown in the opposite direction; each hair is then white, and at the apex black. The tail is whitish, mottled with black; the apical portion is black, and there is a patch of the same colour towards the base on the upper side.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	27	6	Length of ear . . . . .	3	2
to base of ear . . . . .	5	9	Height of body at shoulders . . .	14	0
of tail (hair included) . . . . .	14	6			

Habitat, La Plata, Patagonia, and Chile.

The black and white portions of the hairs on the back produce in that part a mottled appearance, and in the specimen from which the above description is taken, these two colours are about equal in proportion. In another specimen now before me, the black colour predominates on the back. The fur in the younger animals of this species is not so long nor so harsh, and the upper parts are grizzled with black and white; that is to say, these two colours do not form patches of considerable extent as in the adults; the general colouring is also somewhat paler. The chin is brown-black or brown, instead of black, and the upper band, or that, which in the adult extends across the upper part of the neck, is interrupted in the middle; in fact, is only traceable on the *sides* of the neck.

Azara, in his description of the Agouarachay, says, the muzzle, as far back as the eyes, is blackish; whereas, in all the specimens examined by me, the muzzle is of the same colour as the other parts of the head, or *very* nearly so. In other respects his description agrees with the animal described by me, and *not* with the *Canis cinereo-argentatus*, which Desmarest and Lesson suppose to be the Agouarachay of Azara. In Fischer's "*Synopsis Mammalium*" the *Canis Azaræ* is described as having the tip of the tail white; whereas it is black, not only in the five specimens which have come under my notice, but also in those in the collection of Prince Maximilian\* (who was the original describer) and in the Paris Museum.

"This animal has a wide range; Prince Maximilian brought specimens from Brazil; and it is common in La Plata, Chile, the whole of Patagonia, even to the shores of the Strait of Magellan; and a fox, which lives on the small islands not far from Cape Horn, probably belongs to this species. This animal generally frequents desert places; I saw many in the valley of the Despoblado, a branch of

\* I am indebted to Mr. Ogilby, who visited the Prince's collection, for a description from the specimens of *C. Azaræ* therein preserved. In this description the tip of the tail is said to be black.



that of Copiapó, where there is no fresh water, and where, with the exception of some small rodents, (the constant inhabitants of sterile regions) scarcely any other animal could exist. I saw also very many of these foxes wandering about by day (although Azara says they are nocturnal in Paraguay) on the plains of Santa Cruz, where various kinds of mice are abundant, and likewise around the Sierra Ventana. In the course of one day's ride in this latter neighbourhood, (not far from Bahia Blanca, lat. 39° S.) I should think I saw between thirty and forty. They generally were wandering at no great distance from their burrows; but, as they are not very swift animals, our dogs caught two. Azara states that in Paraguay this fox, which he calls the Agourá-chay, inhabits thick woods, and that it makes a great nest or pile of straw, to lie on; but that near Buenos Ayres it uses the holes of the Bizcacha. Further southward, where the Bizcacha is not found, it certainly excavates its own burrow.\* In Chile these foxes are very destructive to the vineyards, from the quantity of grapes they consume; so that boys are generally kept in the vintage season with bells and other means to frighten them away. Azara states, that in Paraguay they likewise eat fruit and sugarcane. By the same authority it is said, that the Agourá-chay, when taken young, is easily domesticated.—D.

## 1. FELIS YAGOUAROUNDI.

## PLATE VIII.

Felis Yagouarundi, *Desmarest*, Mammologie, p. 230.

Yagouarundi, *Azara*, Essais sur l'histoire Naturelle des Quadrupèdes de la Province du Paraguay, tom. i. p. 171.

Felis Darwinii, *Martin*, Proceedings of the Zoological Society of London, 1837, p. 3.

*F. vellere brevi, adpresso, purpurascens-fusco; pilis flavescens annulatis; pedibus nigro lavatis; cauda longissima; auribus parvulis.*

DESCRIPTION.—The fur is rather harsh, short, and somewhat adpressed: the under fur is of a pale grayish brown colour; the hairs which constitute the chief clothing of the animal, are black, annulated with brownish yellow, or in some parts, yellow-white, each hair having about three or four rings. The black and pale colours are about equal in proportion, and their mixture pro-

\* Considering the great difference of climate and other conditions between the hot and wooded country of Paraguay, and the desolate plains of Patagonia, one is led to suspect that the *Canis Azarae* of La Plata and Patagonia, which wanders about by day, and inhabits burrows instead of heaps of straw, may turn out to be a different species from the Agourá-chay of Azara, which is nocturnal in its habits, and lives in thick coverts.

duces a deep brown tint, which is almost uniform throughout the body and limbs. On the head the yellowish colour predominates over the black, excepting on the tip of the muzzle, and thence back to the eye, where the hairs are of a brownish black colour. On the throat the hairs are brown. The underside of the tarsus is black, and on the outer side of the fore-foot there is a black mark which extends upwards on to the wrist. The tail is long and bushy; towards and on the base, the hairs are annulated with black and yellow, like those of the body; but beyond this they are of a more uniform colour, each hair being brown at the base, and gradually shaded into black towards the tip. The ears are small and rounded, and covered with hairs of the same colour as those on the head. The claws are of a large size, and white colour; the toes are united for a considerable portion of their length by the interdigital membrane.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	25	0	Length of ear . . . . .	1	0
to base of ear . . . . .	3	6	Height of body at shoulders . . . . .	12	0
of tail (hairs included) . . . . .	19	0			

Habitat, Rio de Janeiro, Brazil. (*May*.)

“This cat was given me by an old Portuguese priest, who had hunted it down in a thick forest with a small pack of dogs, after a severe chase. It was killed near the Gavia mountain, at the distance of a few miles only from Rio de Janeiro, where it was considered uncommon.” D. Although small, compared with the Puma, (*Felis concolor*, Auct.), this cat, in its slender lengthened body, small head, long tail, and stout limbs, decidedly evinces an affinity to that species. According to the dimensions of the Yagouarundi given by Azara, Desmarest, and Temminck, it appears that the tail is considerably shorter in proportion in the specimens examined by those naturalists, than in the present individual, and the difference was such, as to induce Mr. Martin to believe that the latter was a distinct species; he accordingly proposed for it the specific name of *Darwinii*. At the time that Mr. Martin described the specimen alluded to, I was also inclined to believe it was a distinct species. I mention this because I am afraid my opinion had a slight share in influencing Mr. Martin's determination. I have since seen many specimens, and upon comparing their dimensions, I find that the proportionate length of the tail varies more than is usual in other species of cats, and that the difference in the length in this member is not combined with any other distinguishing character. In colouring there is also a considerable variation, some specimens being almost black, and having the hairs but obscurely annulated with white; in others, the hairs are more distinctly annulated, and the head assumes a grayish hue. Others again, are brown, or black brown,

D



having the hairs annulated with yellow. The following are the dimensions of two specimens in the Paris museum, and those given by the authors above alluded to.\*

	Paris M.		Paris M.		Desmarest.		Temminck.		Azara.	
	In.	Lines.	In.	Lines.	In.	Lines.	In.	Lines.	In.	Lines.
Length from nose to root of tail .	30	6	28	0	23	0	30	0	36	9
of tail . . . . .	24	0	17	0	13	9	22	0	13	9

## 2. FELIS PAJEROS.

### PLATE IX.

Chat Pampa, Azara, Essais sur l'histoire Naturelle des Quadrupèdes du Paraguay. Traduct. Franç. tom. 1. p. 179.

Felis Pajeros, Desmarest, Mammologie, p. 231.

*F. vellere longissimo, flavescenti-griseo, fasciis flavescenti-fuscis indistinctè et sublongitudinalitèr notato; pedibus annulis latis nigris; abdomine maculis magnis nigris; mento albo; caudâ brevi; auribus mediocribus, ad apicem externum nigris.*

DESCRIPTION.—The Pampas cat is about equal in size to the common wild cat of Europe (*Felis Catus*, Linn.). It is however of a stouter form than that animal, the head is smaller, and the tail is shorter.

The most remarkable character in this species consists in the great length of the fur,—the longer hairs on the back measuring upwards of three inches, and those on the hinder part of the back, are from four and a half, to four and three quarter inches in length. The general colour of the fur is pale yellow-gray. Numerous irregular yellow, or sometimes brown stripes run in an oblique manner from the back along the sides of the body. On each side of the face there are two stripes of a yellowish or cinnamon colour: these stripes commence near the eye, extend backwards and downwards over the cheeks, on the hinder part of which they join and form a single line, which encircles the lower part of the throat. The tip of the muzzle and the chin are white, and there is a spot in front of the eye, and a line beneath the eye, of the same colour: the belly and the inner side and hinder part of

\* In measuring the species of Mammalia, I almost invariably, when wishing to give the length, measure from the tip of the nose *along the curve of the back* to the root of the tail. In the Ruminantia of course this plan is not desirable, but in other Mammals I have found it most convenient. If we take a Cat, for instance, and curve the body in whatever way we please, we find the length (taken in the way just mentioned) always the same. Whereas, if we take a straight line (as many naturalists do) the length will vary according to the position of the animal.

the fore-legs are also white. An irregular black line runs across the lower part of the chest and extends over the base of the fore-legs externally, and above this line there are two other transverse dark markings on the chest, which are more or less defined. On the fore-legs there are three broad black bands, two of which encircle the leg, and on the posterior legs there are about five black bands externally, and some irregular dark spots internally. The feet are yellowish, and the underside of the tarsus is of a slightly deeper hue. On the belly there are numerous large irregular black spots. The ears are of moderate size, furnished internally with long white hairs; externally, the ears are of the same colour as the head, excepting at the apex where the hairs are black and form a slight tuft. The tail is short, somewhat bushy, and devoid of dark rings or spots—the hairs are in fact coloured as those of the back of the animal. On the upper part of the body each hair is brown at the base, then yellow, and at the apex, black. On the hinder part of the back the hairs are almost black at the base, and on the sides of the body each hair is gray at the base; there is then a considerable space of yellowish-white colour; towards the apex they are white, and at the apex black. The greater number of the hairs of the moustaches are white.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	26	0	Length of ear . . . . .	1	11
to base of ear . . . . .	3	6	Height of body at shoulders . . . . .	13	0
of tail (fur included) . . . . .	11	0			

Habitat, Santa Cruz, Patagonia, (*April*.) and Bahia Blanca, (*August*.)

The markings in this animal vary slightly in intensity; those on the body are generally indistinct, but the black rings on the legs are always very conspicuous.

“This animal takes its name from ‘paja,’ the Spanish word for straw, from its habit of frequenting reeds. It is common over the whole of the great plains, which compose the eastern side of the southern part of America. According to Azara, it extends northward as far as latitude 30°, and to the south, I have reason to believe, from the accounts I have received, that it is found near the Strait of Magellan, which would give it a range of nearly 1400 miles, in a north and south line. One of my specimens was obtained, in 50° south, at Santa Cruz: it was met with in a valley, where a few thickets were growing. When disturbed, it did not run away, but drew itself up, and hissed. My other specimen was half-grown, and was killed in the end of August, at Bahia Blanca.”—D.



## 2. FELIS DOMESTICA.

*Felis domestica*, *Brisson*, *Reg. Anim.* p. 264.

I find in Mr. Darwin's collection a cat, the colouring and proportions of which, convince me that its origin is from the domestic cat, as however it was shot in a wild state far from any house, a description may, perhaps, prove useful. Its general colour is deep gray, and the body is adorned with numerous irregular narrow black bands; there is a broad black mark, formed of confluent spots, along the middle of the back, which commences a little behind the shoulders; a considerable space around the angles of the mouth, the chin, throat, central portion of the chest, fore-feet, toes of the hinder feet, and the posterior portion of the belly, are white; a black line extends backwards from the posterior angle of the eye, on to the cheeks; thence, across the throat, there are two lines: the space between the eye is chiefly occupied with white hairs: the tail is slender, and tapers towards the apex; the basal half is gray with black rings, and the apical half is black, excepting the extreme point, which is white: the tarsus is black beneath: the legs are of a deep gray colour, banded with black externally.

To the dimensions I will add those of a domestic cat which in colour and markings very closely resembles the animal above described. I may add that I have chosen a cat rather above the ordinary size for my comparison, yet it will be seen that the wild cat has the advantage in bulk.

	Wild Cat.		Domestic Cat.	
	In.	Lines.	In.	Lines.
Length from nose to root of tail . . . . .	22	0	19	0
of tail . . . . .	12	3	11	6
of tarsus . . . . .	5	1	4	7
of ear . . . . .	1	11		
Height at shoulders . . . . .	11	3		

Habitat, Maldonado, La Plata, (*May*.)

"This animal was killed amongst some thickets on a rocky hill a few miles from Maldonado. It appeared, when dead, much larger and stronger than any domestic cat I ever saw, and it was described to me as having been exceedingly fierce. I mention this because M. Temminck supposes that the domesticated varieties of all animals are of larger size, than the wild stock from which they are descended."—D.\*

\* I must refer the reader to my journal for some account of the habits of the jaguar and puma, which being well known animals, and the facts that I mention having little scientific interest, I have not thought it worth while to repeat them here.

## GALLICTIS VITTATA.

*Gallictis vittata*, *Bell*, *Zoological Journal*, vol. ii. p. 551-2.  
 ———, „ *Proceedings of the Zoological Society*, for April, 1837, p. 39.  
*Gulo vittatus*, *Desmarest*, *Mamm.* p. 175.

"This animal is not uncommon at Maldonado, where it is called "*Huron*" or thief, from the ravages it commits on eggs and poultry. Shortly after being killed this specimen weighed 1 lb. 8 oz. (Imp. weight)."—D.

## 1. LUTRA PLATENSIS.

*L. vellere nitido, adpresso, intensè fusco; corpore subtùs pallidiore; gutture ad latera, et subtùs, pallidè fusco; mento rostrique apice sordidè flavescenti-albis; pedibus nigrescenti-fuscis; pilis caudæ supernè brevioribus, adpressis, illis ad caudæ latera longioribus et fimbriam efficientibus.*

DESCRIPTION.—This Otter is about equal in size to the common European species (*Lutra vulgaris*, Auct.): its fur is short, glossy, and adpressed; the under fur is tolerably abundant and of a silky nature. The general colouring of the ordinary fur is deep brown, and that of the under fur is very pale brown, deeper externally. The tint of the under parts of the body is paler than the upper, and may be described as brown, that of the throat, sides and under part of the neck, pale brown; and, on the tip of the muzzle and chin, dirty yellowish-white. The hairs of the moustaches are brownish-white; the ears are covered with short deep brown hairs, those towards the tip are paler. The hairs covering the feet above are short, and of a very deep brown colour. The tail is tolerably long, thick at the base, whence it gradually tapers to the apex. The hairs on the base of the tail resemble those of the body, but on the remaining portion, they are short, glossy, and very closely applied to the skin both on the upper and under surface, whereas those on the sides are longer, and form a kind of fringe. The tip of the muzzle and the soles of the feet are naked, with the exception of the hinder half of the tarsus.

	In.		In.	
	In.	Lines.	In.	Lines.
Length from nose to root of tail . . . . .	28	0	Length of tail . . . . .	18 0

Habitat, La Plata, (*July*.)



The La Plata Otter in its general colouring is of a somewhat deeper hue than the European species, the cheeks and throat instead of being nearly white are of a pale brown colour; the tail is longer in proportion, and tapers more gradually; the tip of the muzzle is naked, but the hairless portion is less than in that species, the boundary line between the naked part and the hair of the top of the muzzle forming almost a semicircle; the retiring extremities of this line touch the posterior angle of the nostril on each side, whereas in the common otter the boundary line of the hair of the muzzle is of a w-like form. The skull is figured in Plate 35, figs. 4, a, b, c, and d, and is compared with that of *L. Chilensis* in the next description.

"This specimen was killed by some fishermen a few miles from Maldonado, near the mouth of the estuary of the Plata, where the water is quite salt. I am not, however, by any means sure that it may not be a fresh-water species, which had wandered from its proper station; in the same manner as not unfrequently is the case with the *Hydrochærus Capybara*. I am indebted to Mr. Chaffers, the master of the Beagle, for having kindly presented me with this specimen." — D.

## 2. LUTRA CHILENSIS.

*Lutra Chilensis*, Bennett, Proceedings of the Committee of Science and Correspondence of the Zoological Society of London for 1832, p. 1.

*L. fusca; vellere mediocri, laxo et sub-extante; mento, gulâ, et faciei lateribus, pallidè fuscis; pedibus saturatè fuscis; corporis pilis ad apicem pallidè fuscis; caudâ mediocri; rostri apice calvo.*

DESCRIPTION.—This species scarcely equals a full grown European otter in size. It is of a brown colour throughout; the cheeks, chin, and throat, being slightly paler, and the feet of a deeper tint, than the other parts. The fur is moderately long, rather harsh to the touch, and semi-erect: the under fur is abundant, and of a soft and silk nature. The hairs of the ordinary fur are deep brown, but tipped with a very pale brown colour. The hairs of the tail, like those of the body, are harsh and semi-erect; towards the apex, those on the upper and under part are in a slight degree shorter than those at the sides, and lie closer to the skin; these differences, however, are not very apparent on the upper side, though distinct on the under. The feet are naked beneath, with the exception of the posterior half of the tarsus. The hair of the muzzle extends only down to the posterior angle of the

nostrils, where it terminates in a straight line, leaving the tip of the muzzle naked.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	31	0	Length of tail . . . . .	14	3

Habitat, Chonos Archipelago, (*January.*)

The Chile Otter was originally described by Mr. Bennett from a specimen presented to the Zoological Society by Mr. Cuming, but as this specimen is a young animal, scarcely half-grown, it does not present some of the characters of the species in so marked a manner as the adult. I have, therefore, availed myself of an adult specimen in Mr. Darwin's collection, to draw up the above description.

Compared with the Common Otter (*Lutra vulgaris*, Auct.) the most striking difference consists in the character of the fur: the hairs instead of being adpressed as in that species, are here semi-erect, and appear as if they had been clipped at the extremity. The fur is of a deeper colour, but has a slightly grizzled appearance, owing to the tip of each hair being of a much paler colour than the remaining part.

In the young animal described by Mr. Bennett, (which in weight was probably not more than one-third of that of the present animal) the hairs of the body are of an uniform deep brown colour; hence, if I am right in considering Mr. Darwin's animal as the same species, it would appear that the grizzled character of the fur is dependent on age.

The semi-erect fur will also serve to distinguish the present species from the *Lutra Platensis*; the fur is likewise longer, the tail is shorter, and the feet are smaller in proportion. The most important distinctions, however, are furnished by the skulls; I will, therefore, compare them.

The skull of *L. Chilensis* compared with that of *L. Platensis*, (Plate 35, figs. 4.) when viewed from above, presents but little difference in general form; it is, however, smaller in all its proportions, and the zygomatic arch is a little less convex: the palate is proportionately shorter; the tympanic bullæ are much smaller, less elevated, and wider apart, in which respect there is a greater approximation to the skull of *L. vulgaris* than to that of *L. Platensis*; but here, the tympanic bullæ are larger than in *L. Chilensis*. Both in *L. Chilensis* and *Platensis*, the sub-orbital foramina are kidney-shaped, the emarginated portion being downwards, whilst in *L. vulgaris* they approach somewhat to a triangular figure, the apex being external. In *L. Chilensis*, however, this foramen is comparatively larger than in *L. Platensis*, and the outer portion of the foramen forms the



segment of a larger circle than the inner one, whilst in *L. Platensis* both portions are equal.

The principal difference in the dentition of the La Plata and the Chile otters, consists in the comparatively smaller size of the posterior molars, both of the upper and lower jaws, of the latter species. In the upper jaw, the "carnassière" has its inner lobe, approaching somewhat to a triangular form, whereas in *L. Platensis* it is broader and almost semicircular. In the lower jaw, the last molar but one has the inner lobe much smaller than the middle outer lobe, whilst in *L. Platensis* these two lobes are of nearly equal size and elevation. Other points of dissimilarity will be perceived in the annexed table of admeasurements.

	<i>L. Chilensis.</i>	<i>L. Platensis.</i>
	In. Lines.	In. Lines.
Whole length of skull . . . . .	3 9 $\frac{3}{4}$	4 2 $\frac{1}{2}$
Greatest width . . . . .	2 6 $\frac{1}{2}$	2 10 $\frac{1}{2}$
Width of skull from the apex of one mastoid process to the opposite . . . . .	2 3 $\frac{1}{4}$	2 8 $\frac{1}{4}$
Length of palate . . . . .	1 6	1 10
Breadth of palate between the posterior molars . . . . .	7 $\frac{3}{4}$	7 $\frac{3}{4}$
Length from last molar to posterior margin of palate . . . . .	3 $\frac{1}{2}$	5 $\frac{1}{2}$
from base of canine to hinder part of last molar . . . . .	11 $\frac{3}{8}$	1 1 $\frac{1}{2}$
of carnassière . . . . .	5	5 $\frac{3}{8}$
Width of do. . . . .	5	6 $\frac{1}{4}$
Length of last molar . . . . .	2 $\frac{3}{4}$	3 $\frac{1}{2}$
Width of do. . . . .	4 $\frac{1}{2}$	5 $\frac{3}{8}$
Length of ramus of lower jaw . . . . .	2 4 $\frac{1}{2}$	2 8 $\frac{3}{4}$
from canine to hinder portion of last molar (lower jaw) . . . . .	1 2 $\frac{1}{4}$	1 4 $\frac{1}{4}$
of last molar but one (lower jaw) . . . . .	5 $\frac{3}{8}$	6 $\frac{3}{8}$
Width of do. . . . .	2 $\frac{3}{8}$	3 $\frac{1}{2}$

"These animals are exceedingly common amongst the innumerable channels and bays, which form the Chonos Archipelago. They may generally be seen quietly swimming, with their heads just out of water, amidst the great entangled beds of kelp, which abound on this coast. They burrow in the ground, within the forest, just above the rocky shore, and I was told, that they sometimes roam about the woods. This otter does not, by any means, live exclusively on fish. One was shot whilst running to its hole with a large volute-shell in its mouth; another (I believe the same species) was seen in Tierra del Fuego devouring a cuttle fish. But in the Chonos Archipelago, perhaps the chief food of this animal, as well as of the immense herds of great seals, and flocks of terns and cormorants, is a red coloured crab (belonging to the family Macrouri) of the size of a prawn, which swims near the surface in such dense bodies, that the water appears of a red colour. This specimen weighed nine pounds and a half."—D.

## FAMILY—DELPHINIDÆ.

## DELPHINUS FITZROYI.

## PLATE X.

*D. supra niger; capitis corporisque lateribus, corporeque subtus niveis; caudâ, pedibus, labioque inferiore, nigris; fuscis latis duabus per latus utrumque obliquè excurrentibus, nigréscenti-cinereis, hujusque coloris fasciâ utrinque ab angulo oris ad pedem tendente.*

DESCRIPTION.—Upper parts of the body black, under parts pure white, the two blended into each other by gray: extremity of snout, a ring round the eye, the edge of the under lip, and the tail fin, black; dorsal and pectoral fins dark gray; a broad gray mark extends from the angle of the mouth to the pectoral fin; above which, the white runs through the eye and is blended into gray over the eye; two broad deep-gray bands are extended in an oblique manner along each side of the body, running from the back downwards and backwards; iris of eye dark brown. Body anteriorly somewhat depressed, posteriorly compressed; head conical, arched above; the lower lip projecting beyond the upper; eye placed above and behind, but near the angle of the mouth; breathing vent situated in the same line as the eyes—supposing a circle to be taken round the head. Teeth slightly curved, and conical; in the upper jaw twenty-eight in number on each side, and in the lower, twenty-seven.

	Ft.	In.	Lines.
Total length (measuring along the curve of back) . . . . .	5	4	0
Length from tip of muzzle to vent . . . . .	3	10	9
to dorsal fin . . . . .	2	6	5
to pectoral . . . . .	1	4	5
to eye . . . . .	0	9	9
to breathing aperture (following curve of head) . . . . .	0	10	7
to angle of mouth . . . . .	0	7	9
of dorsal fin along the anterior margin . . . . .	1	0	5
Height of do. . . . .	0	6	4
Length of pectoral, along anterior margin . . . . .	1	2	8
Width of tail . . . . .	1	4	5
Girth of body before dorsal fin . . . . .	3	0	6
before pectoral fin . . . . .	2	8	2
before tail fin . . . . .	0	7	8
of head over the eyes . . . . .	2	0	0

Habitat, coast of Patagonia, Lat. 42° 30', (April.)

E



This species, which I have taken the liberty of naming after Captain Fitz-Roy, the Commander of the Beagle, approaches in some respects to the *Delphinus superciliosus* of the "Voyage de la Coquille," but that animal does not possess the oblique dark-gray bands on the sides of the body; it likewise wants the gray mark which extends from the angle of the mouth to the pectoral fins. In the figure the under lip of the *D. superciliosus* is represented as almost white, whereas in the present species it is black: judging from the figures, there is likewise considerable difference in the form. The figure which illustrates this description agrees with the dimensions, which were carefully taken by Mr. Darwin immediately after the animal was captured, and hence is correct.

"This porpoise, which was a female, was harpooned from the Beagle in the Bay of St. Joseph, out of several, in a large troop, which were sporting round the ship. I am indebted to Captain FitzRoy for having made an excellent coloured drawing of it, when fresh killed, from which the accompanying lithograph has been taken."—D.

#### FAMILY—CAMELIDÆ.

##### AUCHENIA LLAMA. *Desmarest.*

Guanaco of the aborigines of Chile.

"THE Guanaco abounds over the whole of the temperate parts of South America, from the wooded islands of Tierra del Fuego, through Patagonia, the hilly parts of La Plata, Chile, even to the Cordillera of Peru. I saw several of these animals in Navarin Island, forty miles north of Cape Horn; the Guanaco, therefore, has, with the exception of a fox and mouse, inhabitants of the same island, the most southern range of all American quadrupeds. Although preferring an elevated site, it yields in this respect to its near relative the Vicuña. On the plains of Southern Patagonia, we saw them in greater numbers than in any other part. Generally they go in small herds, from half a dozen to thirty together; but on the banks of the Santa Cruz, we saw one herd, which must have contained at least five hundred. On the northern shores of the Strait of Magellan they are also very numerous. The Guanacoës are generally wild and extremely wary: Mr. Stokes told me, that he one day in Patagonia saw through a glass a herd of these beasts, which evidently had been frightened, and were running away

at full speed, although their distance was so great that they could not be distinguished by the naked eye.

"The sportsman frequently receives the first intimation of their presence, by hearing from a long distance their peculiar shrill neighing note of alarm. If he then looks attentively, he will, perhaps, see the herd standing in a line on the side of some distant hill. On approaching, a few more squeals are given, and then off they set, at an apparently slow but really quick canter, along some narrow beaten track to a neighbouring hill. If, however, by chance he should abruptly meet a single animal, or several together, they will generally stand motionless, and intently gaze at him;—then, perhaps, move on a few yards, turn round, and look again. What is the cause of this difference in their shiness? Do they mistake a man in the distance for their chief enemy the puma? Or does curiosity overcome their timidity? That they are curious is certain, for if a person lies on the ground, and plays strange antics, such as throwing up his feet in the air, they will almost always approach by degrees to reconnoitre him. It is an artifice that was repeatedly practised with success by the sportsman of the Beagle, and it had moreover the advantage of allowing several shots to be fired, which were all taken as parts of the performance. On the mountains of Tierra del Fuego, and in other places, I have more than once seen a Guanaco on being approached, not only neigh and squeal, but prance and leap about in the most ridiculous manner, apparently in defiance, as a challenge. These animals are very easily domesticated, and I have seen some in this state near the houses in northern Patagonia, although at large on their native plains. They are, when thus kept, very bold, and readily attack a man, by striking him from behind with both knees. It is asserted, that the motive for these attacks is jealousy on account of their females. The wild Guanacoës, however, have no idea of defence; and even a single dog will secure one of these large animals, till the huntsman can come up. In many of their habits they are like sheep in a flock. Thus when they see men approaching in several directions on horseback, they soon become bewildered, and know not which way to run. This circumstance greatly facilitates the Indian method of hunting, for they are thus easily driven to a central point, and are encompassed.

"The Guanacoës readily take to the water; several times at Port Valdes they were seen swimming from island to island. Byron, in his voyage, says he saw them drinking salt water. Some of our officers likewise saw a herd apparently drinking the briny fluid from a Salina near Cape Blanco; and in several parts of the country, if they do not drink salt water, I believe they drink none at all. In the middle of the day, they frequently roll in the dust, in saucer-shaped hollows. The males often fight together; one day two passed quite close to me, squealing and trying to bite each other; and several were shot with their



hides deeply scored. Herds appear sometimes to set out on exploring parties: at Bahia Blanca, where within thirty miles of the coast these animals are extremely scarce, I one day saw the tracks of thirty or forty, which had come in a direct line to a muddy salt water creek. They then must have perceived, that they were approaching the sea, for they had wheeled with the regularity of cavalry, and had returned back in as straight a line, as they had advanced. The Guanacoes have one singular habit, the motive of which is to me quite inexplicable, namely, that on successive days they drop their dung on one defined heap. I saw one of these heaps, which was eight feet in diameter, and necessarily was composed of a large quantity. Frezier remarks on this habit as common to the Guanaco as well as to the Llama;\* he says it is very useful to the Indians, who use the dung for fuel, and are thus saved the trouble of collecting it.

"The Guanacoes appear to have favourite spots for dying in. On the banks of the Santa Cruz, the ground was actually white with bones in certain circumscribed spaces, which generally were bushy and all near the river. On one such spot I counted between ten and twenty heads. I particularly examined the bones; they did not appear, as some scattered ones which I had seen, gnawed or broken as if dragged together by a beast of prey. The animals in most cases, must have crawled, before dying, beneath and amongst the bushes. Mr. Bynoe informs me, that during the last voyage, he observed the same circumstances on the banks of the Rio Gallegos. I do not at all understand the reason of this; but I may add, that the Guanacoes which were wounded on the plains near the Santa Cruz invariably walked towards the river. This quadruped seems particularly liable to contain in its stomach bezoar stones. The Indians who trade at the Rio Negro, bring great numbers to sell as Remedios or quack medicines; and I saw one old man with a box quite full of them, large and small."—D.

\* D'Orbigny says, (vol. ii. p. 69,) that all the species of the genus have this habit.

## FAMILY—CERVIDÆ.

## CERVUS CAMPESTRIS.

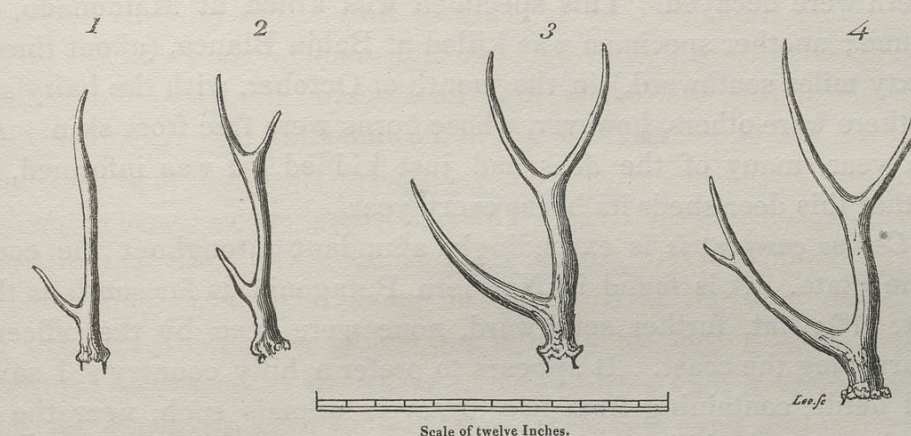
*Cervus campestris*, *F. Cuvier*, in *Dict. des Sc. Nat.* VII. p. 484.

———, *Cuvier* *Oss. Foss.* IV. p. 51. Pl. 3. f. 46.\*

Guazuti, *Azara*, "Natural History of the Quadrupeds of Paraguay." W. P. Hunter's translation, vol. i. p. 135.

———, French translation, vol. i. p. 77.

BESIDES skins of this species of stag, I find, in Mr. Darwin's collection, three pairs of horns, which, together with a pair belonging to one of the skins, constitute a sufficiently complete series to illustrate the different forms which these appendages assume, as the animal increases in size.



The above four sketches, which are all drawn to the same scale, will help to convey a clear idea of the forms, and relative proportions, of these horns.

The most simple horn (fig. 1.) consists of a *beam*, eight and a half inches long, which is slightly arched outwards and considerably compressed about two and a half inches from the apex. At one inch from the base there is a small brow antler which projects forwards and upwards.

In the next horn, (fig. 2.) there is the same small brow antler, but there is a single small *snag*, about equal in size to the brow antler, which is directed back-

\* Figures 47 and 48 of M. Cuvier's work represent horns so unlike either of those brought over by Mr. Darwin, that I cannot help suspecting they belong to some other species of stag.



wards and upwards, and is situated at three and a quarter inches from the apex of the beam. The total length of the beam is eight inches, measured in a straight line.

The third pair of horns, (fig. 3.) which must have belonged to an animal considerably older than either of the preceding pairs, exhibits a large brow antler, in length exceeding half that of the beam: here the posterior snag is also large, and is directed backwards and upwards, whilst the apical portion of the beam is directed forward about as much as the snag is directed backwards. The total length of this horn is eleven and a half inches, measured in a straight line.

The last figure (No. 4.) represents the horn of one of the specimens of which an entire skin was brought over. This horn differs only from the last in being slightly larger, and in having two additional small snags, one springing from the under side, and near the apex, of the brow antler, and the other springing from the hinder part, and near the apex of the great posterior snag.

"The Spaniards say they can distinguish how old a deer is by the number of the branches on the horns. They affirmed that the specimen, of which figure 4 represents one of the horns, was nine years old. It certainly was a very old one, as all its teeth were decayed. This specimen was killed at Maldonado, in the middle of June; another specimen was killed at Bahia Blanca, (about three hundred and sixty miles southward,) in the month of October, with the hairy skin on the horns: there were others, however, whose horns were free from skin. At this time of the year, many of the does had just kidded. I was informed, by the Spaniards, that this deer sheds its horns every year.

"The *Cervus campestris* is exceedingly abundant throughout the countries bordering the Plata. It is found in Northern Patagonia as far south as the Rio Negro, (Lat. 41°); but, further southward, none were seen by the officers employed in surveying the coast. It appears to prefer a hilly country; I saw very many small herds, containing from five to seven animals each, near the Sierra Ventana, and among the hills north of Maldonado. If a person, crawling close along the ground, slowly advances towards a herd, the deer frequently approach, out of curiosity, to reconnoitre him. I have by this means killed, from one spot, three out of the same herd. Although thus so tame and inquisitive, yet, when approached on horseback, they are exceedingly wary. In this country nobody goes on foot, and the deer knows man as its enemy, only when he is mounted, and armed with the bolas. At Bahia Blanca, a recent establishment in Northern Patagonia, I was surprised to find how little the deer cared for the noise of a gun: one day, I fired ten times, from within eighty yards, at one animal, and it was much more startled at the ball cutting up the ground, than at the report.

"The most curious fact, with respect to this animal, is the overpoweringly

strong and offensive odour which proceeds from the buck. It is quite indescribable: several times, whilst skinning the specimen, which is now mounted at the Zoological Museum, I was almost overcome by nausea. I tied up the skin in a silk pocket-handkerchief, and so carried it home: this handkerchief, after being well washed, I continually used, and it was, of course, as repeatedly washed; yet every time, when first unfolded, for a space of one year and seven months, I distinctly perceived the odour. This appears an astonishing instance of the permanence of some matter, which in its nature, nevertheless, must be most subtle and volatile. Frequently, when passing at the distance of half a mile to leeward of a herd, I have perceived the whole air tainted with the effluvium. I believe the smell from the buck is most powerful at the period when its horns are perfect, or free from the hairy skin. When in this state the meat is, of course, quite uneatable; but the Spaniards assert, that if buried for some time in fresh earth, the taint is removed. These deer generally weigh about sixty or seventy pounds."—D.

#### FAMILY—MURIDÆ.

##### 1. *MUS DECUMANUS*.

*Mus decumanus*, *Auctorum*.

In the extensive collection of Rodent animals brought home by Mr. Darwin, I find several specimens of the above named species, that is to say, animals which resemble the European specimens of *Mus Decumanus* in all those characters which are the least liable to variation in individuals of the same species, such as the proportions which the various parts of the animal bear to each other: they differ, however, somewhat in colouring.

Buenos Ayres, Maldonado, Valparaiso, East Falkland Island, and Keeling Island, are each, it appears, infested with the common European rat. I have now before me two specimens from East Falkland Island, and one specimen from each of the other localities, and among these I find none equal in size to the largest European specimens: as regards the colouring, the Buenos Ayres specimen differs only from the English specimens of *Mus Decumanus*, in having the upper parts of a richer and deeper hue, owing to the tips of the shorter hairs being of a deep yellow instead of pale yellow, and in having a rusty tint over the haunches.



Mr. Darwin found this variety "common about houses in the country around Buenos Ayres."

In the Maldonado variety, the shorter hairs of the upper parts of the body are of a rusty yellow colour at the apex, in other respects it resembles the British variety. The rusty yellow colour of the tips of the hairs produces a general reddish hue, which is the more conspicuous, when the animal is placed near an English specimen. "Was caught in a house, at Maldonado. I saw a specimen of the common gray English, or Norway rat, lying dead in the streets, and it certainly had a very different appearance from these red rats. The latter, I saw crawling about the hedges in the interior provinces at Santa Fé, and likewise in the forest of the island of Chiloe. This latter fact, however, is a strong argument against its being aboriginal, since I did not find even one undoubted American species, out of the many which I collected, inhabiting both sides of the Cordillera."—D.

The specimen from Valparaiso very closely resembles that from Maldonado; it is, perhaps, a little less red. "Common about the houses in the town of Valparaiso."

The two specimens from East Falkland are of a brighter hue, and have less gray in their colouring, than in the European variety of the common rat. "One of them was caught in a Bay, which is sometimes frequented by shipping, but which is distant thirty or forty miles from any habitation. These rats have spread, not only over the whole of East and West Falkland, but even on some of the outlying islets. When the cold, wet, and gloomy nature of the climate is considered, it is surprising that these animals should be able to find food to live on."—D.

The general hue of the Keeling Island specimen, is deep brown, the longer hairs of the upper parts of the body being, as usual, black; but the shorter hairs, instead of having the pale yellow tint which we observe in the European, (or, rather, British) specimens of *Mus Decumanus*, are of a deep, rusty yellow. The most remarkable difference, however, consists in the colouring of the under parts being of a yellowish tint, and, towards the root of the tail, of a very distinct buff yellow: the feet are brownish.

"This rat is exceedingly numerous on some of the low coral islets forming the margin of the Lagoon of Keeling Island, in the Indian Ocean. The climate is dry and hot. The rats are known to have come in a vessel from the Mauritius, which was wrecked on one of the islets, which is now called Rat Island. They appeared stunted in their growth, and many of them were mangy. They are supposed to live chiefly on cocoa-nuts, and any animal matter the sea may chance to throw up. They have not any fresh-water; but the milk of the cocoa-nut would supply its place."—D.

The principal dimensions of the above animals are as follows:—

	Specimen from		Maldonado.		Valparaiso.	East Falkland.	East Falkland.	Keeling Island.
	Buenos Ayres		In. Lines.	In. Lines.	In. Lines.	In. Lines.	In. Lines.	In. Lines.
Length from nose to root of tail .	9	9	9	3	8	6	8	9
of tail . . . . .	Imperfect		6	0	6	6	Imperfect	6
of tarsus . . . . .	1	7	1	7	1	7	1	7

Upon comparing the skull of the Valparaiso variety with that of a British specimen of *Mus decumanus*, I could perceive no difference. A skull from West Falkland did not differ, neither did the dentition of the Keeling Island specimen above noticed. A perfect specimen of this last I have not had an opportunity of examining.

## 2. MUS (DECUMANUS var.?) MAURUS.

*Mus maurus*, Waterh. in Proceedings of the Zoological Society of London, for February, 1837, p. 20.

*M. pilis suprà purpurescanti-nigris; subtùs plumbeis; auribus parvulis, pallidè fuscis; caudà corpus ferè æquante.*

DESCRIPTION.—The character of the fur of this animal nearly resembles that of *Mus decumanus*; it is, however, of a harsher nature: the general colour of the upper parts and sides of the body is purple-black, arising from the longest hairs being of this colour, and likewise the tips of those which are next in length; the latter, however, excepting at the tip, are white, and this white is not entirely hidden, even when the hairs are in their ordinary position: on the head the hairs assume a brownish hue, and are tolerably uniform: the limbs, and under parts of the body, are of a deep gray colour, with a faint purple-brown wash: the under fur is gray: the ears are small, of a brown-white, or very pale brown colour, and furnished with minute brown hairs: the small, scattered, bristly hairs of the tail are of an uniform brownish-black colour. The hairs of the moustaches are black at the base, and grayish at the apex.

	In. Lines.		In. Lines.
Length from nose to root of tail . . . . .	11 3	Length of ear . . . . .	0 6½
of tail . . . . .	7 6	from nose to ear . . . . .	2 2
of tarsus . . . . .	1 8		

Habitat, Maldonado, La Plata, (June.)



This rat is very closely allied to *Mus decumanus*, and I think may possibly prove an extraordinary local variety of that animal. Having but one skin, and no skull, I am unable to satisfy myself on this point. Its size, as will be seen by the admeasurements, exceeds that of the common rat, or, rather, it exceeds ordinary specimens of that animal, for I have seen *some* which were equal to it.

"It was killed near Maldonado, where it frequented holes in the sand hillocks near the shore. It is likewise found on the island of Guritti. If ships are ever infested with these monstrous rats, the above-mentioned localities are very likely places to have received colonies by such means. An old male weighed fifteen ounces and three quarters. The ears of this rat, when alive, were of a pale colour, which made a singular contrast with the black fur of its body."—D.

### 3. MUS JACOBÆ.

*Mus decumanoïdes*,\* *Waterh.* in "Catalogue of the Mammalia preserved in the Museum of the Zoological Society of London."

*M. supra fuscus, griseo-lavatus, subtus albus: pedum pilis sordidè albis; caudâ corpore cum capite paulò longiore; auribus mediocribus: pilis perlongis in dorso crebrè inter cæteros commixtis.*

DESCRIPTION.—The general tint of the upper parts of this rat, is grayish-brown, (very nearly resembling that of *Mus decumanus*); the longest hairs, which on the hinder portion of the back are one inch and a half in length, are black; the ordinary hairs are black at the apex, there is then, on each hair, a considerable space occupied by pale yellow, and the remaining, or basal portion, is grayish white; the under fur is gray: the hairs of the chin, throat, and under parts of the body, are white, and without any gray colour at the roots: the feet are covered with dirty grayish hairs: the tail, which is slender, is very sparingly furnished with minute black hairs, both above and beneath: the ears are of moderate size, of a brownish flesh colour, and, to the naked eye, appear to be destitute of hair. The hairs of the moustaches are most of them black at the base, and grayish at the apex.

\* The MS. name of *M. decumanoïdes*, which I had applied to this animal, has been changed, in consequence of my having seen a different species, with the same name attached, in the museum of the India House.

	In. Lines.		In. Lines.
Length from nose to root of tail . . .	7 6	Length of ear . . .	0 7½
of tail . . .	7 6	from nose to ear . . .	1 7½
of tarsus . . .	1 4¼		

Habitat, James Island, Galapagos Archipelago, Pacific Ocean, (*October.*)

This species is scarcely equal in size to a full grown common black rat, (*Mus Rattus*), the head is rather shorter in proportion, the tarsi are smaller, and the tail is longer. In the character of the fur, and length of the hairs, it *very* closely resembles that species: the ears are larger than in *M. decumanus*, and about equal to those of *M. Rattus*. In having the hairs of the under parts of the body of an uniform colour, (i. e. not gray at the base,) it resembles the *Mus Tectorum* of Savi; but the large size of that animal, the greater length of the fur, and its colouring, all serve to distinguish it from the present species, which I may here observe, is truly an old world form, and very distinct from another species, also from the Galapagos, which is hereafter described.

"It is very common in James Island, but is not found on all the islands, if on any other in the Archipelago. Although its appearance is so like that of the common rat, yet its habits appear to be rather different: it is less carnivorous, and does not appear to be so strongly attached to the habitations of man. This island was frequented, about one hundred and fifty years since, by the vessels belonging to the Bucaniers; so that the common rat might easily have been transported here. And if a very peculiar climate, a volcanic soil, and strange food, can together produce a race, or strongly marked variety, there is every probability of such change having taken place in this case."—D.

### 4. MUS (RATTUS var.?) INSULARIS.

*M. supra grisescenti, colore subtus dilutiore; tarsis purpureo-nigris: caudâ corpus cum capite æquante: auribus mediocribus: vellere molli.*

DESCRIPTION.—No. 1. The general colour of this animal is what might be termed black, there is, however, an obscure purple-brown hue on the upper parts of the body, and the sides and under parts have a grayish tint, the hairs covering the feet above are of an uniform deep purple-brown, almost black. All the hairs of the body are gray at the base: the hairs of the moustaches are long and numerous, and of a black colour, having one or two white hairs intermixed: the ears are of moderate size, and very sparingly furnished with



minute dark hairs: the tail is long and slender, and has small, scattered, bristly hairs, of a brown-black colour.

	In. Lines.		In. Lines.
Length from nose to root of tail . . .	7 0	Length of ear . . . . .	0 7
of tail . . . . .	6 6	from nose to ear . . . . .	1 6
of tarsus . . . . .	1 3½		

No. 2. Hairs along the centre of the back chiefly black, and but obscurely annulated, near the apex, with deep yellow: towards the sides of the body, and over the haunches, the hairs are more distinctly annulated, and on the sides of the body they are of a pale yellow at the apex: on the under parts the hairs are gray, tipped with dirty yellowish white: the feet are of the same deep purple-brown hue as in the specimen first described.

Habitat, Ascension Island, Atlantic Ocean, (*July*.)

These two animals not only differ in the colour of the fur, one being of a grizzled brownish colour, and the other black, but there is a considerable difference in the texture of the fur. In the black specimen, the fur is very soft and glossy, and the long hairs, which are abundant, are very slender. In the brown specimen, the fur is of a harsher nature, the long hairs are not so abundant, but longer, and less slender. On the other hand, they agree in size, dentition, the length of the head, tarsus, and ears, and differ but in a trifling degree (about three lines,) in the length of the tail.

Upon comparing the Ascension Island specimens with *M. Rattus*, I find that, although in size they are about one third less, yet the teeth precisely agree, not only in form, but in size. The relative proportions of the head, ears, and tarsi, also agree. Besides the general colouring of the fur, they both differ in having the hairs of the feet uniformly purple-black, those in *Mus Rattus* being much paler, and even whitish, on the toes. In the character of the fur, there is much difference. The long silky hairs, which are so conspicuous in *Mus Rattus*, are replaced, in the black specimen, by hairs which are scarcely to be distinguished from the ordinary fur; and in the other specimen, although rather longer and more distinct, they are short, compared with those of the black rat.

“The specimen which has a black, and glossy fur, frequents the short coarse grass near the summit of the island, where the common mouse likewise occurs. It is often seen running about by day, and was found in numbers, when the island was first colonized by the English, a few years since. The other, and browner coloured variety, lives in the out-houses near the sea-beach, and feeds

chiefly on the offal of the turtles, slaughtered for the daily food of the inhabitants. If the settlement were destroyed, I feel no doubt that this latter variety would be compelled to migrate from the coast. Did it originally descend from the summit? and, in the case just supposed, would it retreat there? and, if so, would its black colour return? It must, however, be observed, that the two localities are separated from each other by a space, some miles in width, of bare lava and ashes. Does the summit of Ascension, an island so immensely remote from any continent, and the summit itself surrounded by a broad fringe of desert volcanic soil, possess a small quadruped, peculiar to itself? Or, more probably, has this new species been brought, by some ship, from some unknown quarter of the world? Or, I am again tempted to ask, as I did in the case of the Galapagos rat, has the common English species been changed, by its new habitation, into a strongly marked variety?”—D.

Mr. Darwin seems to have foreseen the difficult problem which these two rats have furnished, and although I have spent much time in studying the Muridæ, I must confess I have been exceedingly puzzled by the animals in question. It appears as if the brown, and black rats, (*M. decumanus*, and *M. Rattus*.) and likewise the common mouse, (*M. Musculus*),\* all of which follow man in his peregrinations, and which, to a certain degree, are dependent upon man, and may therefore be termed semi-domestic animals; like *really* domestic animals, are subject to a greater degree of variation than those species which hold themselves aloof from him.

Upon the whole then I have determined to describe the two Ascension Island specimens as one species, and as varieties of the *Mus Rattus*, but with a mark of doubt, since I do not possess sufficient materials for a rigorous examination, having, in fact, but one skin of each variety, and neither skull nor skeleton. I have also applied the name of *insularis*, to designate this variety or species, whichever it may be, for, supposing it be not a distinct species, it is so marked a variety, that a name for it is desirable.

\* The great Bandicoot rat of India, (*Mus giganteus*, of Hardwicke,) ought, perhaps, to be added to the species above enumerated; and I strongly suspect several catalogued species will prove but varieties of this animal.



5. *MUS MUSCULUS*.*Mus Musculus, Auctorum.*

Of this species, there are six specimens in Mr. Darwin's collection; two were found "living in the short grass, near the summit of the Island of Ascension, where the climate is temperate."—D. Two others were procured "on a small, stony, and arid island, near Porto Praya, the capital of St. Jago, in the Cape de Verde Islands,—climate very hot and dry. Excepting during the rainy season, which is of short duration, these little animals can never taste fresh water, nor does the island afford any succulent plant."—D. A specimen was also procured "on a grassy cliff, on East Falkland Island, at the distance of a mile from any habitation. It is singular that so delicate an animal should be able to subsist under the cold, and extremely humid climate, of the Falkland Islands, and on its unproductive soil."—D. These specimens are all of them rather less than full grown individuals of the same species procured in England; in other respects, they do not differ.

The sixth specimen, which is from Maldonado, is considerably less than British specimens of the common mouse, and is of a richer and brighter colour, the head is smaller, the muzzle shorter in proportion, whilst the tarsi are even longer than in a large specimen of *M. Musculus*. These points of dissimilarity induced me to believe it was a distinct species, and to apply to it the specific name of *brevirostris*.\* Upon re-examination, with the advantage of more experience, and consequently a better knowledge of the characters of these animals, I have changed my opinion. The teeth indicate that it is not an adult specimen, and agree perfectly with those of *M. Musculus*, both in form and size. "Common in the houses of the town of Maldonado, and its habits are similar to those of *Mus Musculus*."—D.

\* See Proceedings of the Zoological Society for February 14th, 1837, p. 19.

6. *MUS LONGICAUDATUS*.

PLATE XI.

*Mus longicaudatus*, Bennett, Proceedings of the Committee of Science and Correspondence of the Zoological Society of London for January, 1832, p. 2.

*M. pallidè flavescenti-fuscus; corpore subtùs albo, levitèr flavo lavato; pedibus albis; tarsis permagnis; caudâ perlongâ; auribus parvulis.*

DESCRIPTION.—Fur long and soft; general colour pale yellow-brown, the hairs of the ordinary fur being fulvous near the apex, and the longer hairs brown. On the sides of the body, cheeks, and external side of limbs, the fulvous hue prevails. The inner side of the limbs and the under parts of the body are white, but have an indistinct yellowish hue. All the hairs of the body are of a deep gray colour at the base. The ears are small, well clothed with hairs; those on the inner side are chiefly yellow; externally, on the fore part they are brown, and posteriorly whitish. The feet are of a flesh-colour, and furnished above with white hairs; the tarsi are but sparingly provided with minute hairs on the upper side, and are naked beneath: they are of unusually large size. The fore feet are of moderate\* size, and furnished with a very large carpal tubercle. The tail is very nearly double the length of the body, if the latter be measured in a straight line; it is of a brownish flesh-colour above, paler beneath, and sparingly furnished with minute bristly hairs; those on the upper surface being brown, and on the under side white. The hairs of the moustaches are long, of a black colour, and grayish at the apex.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	3	9	Length of tarsus (claws included) . . .	1	1
of tail . . . . .	5	3	of ear . . . . .	0	4
from nose to ear . . . . .	0	10½			

Habitat, Chile.

\* As I shall have occasion to use the terms *moderate*, *long*, *short*, *large*, &c. it may be well to state that I take the common mouse, (*Mus Musculus*), as my standard of comparison. The ears, feet, tail, length of the fur, general proportions, &c. are in that animal what I term moderate.



The most conspicuous characters of the present species consist in the immense length of the tail, and the great size of the hinder feet.\* It is about equal in size to *Mus Musculus*; its form, however, is somewhat stouter; in colour it is much paler and brighter. The head is larger in proportion; the ears are smaller, and more densely clothed with hair; the fore feet are rather larger, and the fleshy tubercle on the under side of the wrist is also larger. The thumb nail is flattened, and rounded at the tip, as in *Mus Musculus*, but is longer, and more distinct than in that animal.

The skull of *M. longicaudatus*, (Plate 34, Fig. 1,) is considerably larger than that of the common mouse, but in form scarcely differs from it; its upper surface is rather more convex, and the interparietal bone proportionately less. The length of the skull is 1 inch; breadth,  $6\frac{1}{2}$  lines; distance between the fore part of the incisor, and the first molar of the upper jaw,  $3\frac{1}{2}$  lines. The dentition is figured in Plate 34, Figs. 1. *b* and 1. *c*.

The above account is drawn up from the same specimen as that from which Mr. Bennett took his description, and which was brought from Chile by Mr. Cum- ing, who states that the animal in question lives in trees, and constructs its nest with grass.

In Mr. Darwin's collection, I find an animal which agrees in all the more important characters with the one above described, but differs in being of a deeper colour, (approaching more nearly, in this respect, to the common mouse,) and in having the tail a trifle shorter. The skull is about  $\frac{3}{4}$  of a line shorter, but its proportions agree precisely: the proportions of the feet, and the general form of the animal, also agree. This specimen is likewise from Chile, (Lat  $37^{\circ} 40'$ ), and, according to Mr. Darwin, "overran the wooded country south of Concepcion, in swarms of infinite numbers. Captain FitzRoy, on his return from visiting the wreck of H. M. S. Challenger, had the kindness to bring me this specimen. So destructive was this little animal, that it even gnawed through the paper of the cartridges belonging to the people who were wrecked."—D.

\* A long tarsus is generally accompanied by a proportionately long tail. I presume that those Mice which have long tarsi are in the habit of making great leaps, and that in these leaps, the tail serves to steady and balance the body.

## MUS ELEGANS.

## PLATE XII.

*Mus elegans*, Waterh., Proceedings of the Zoological Society of London for February 1837, p. 19.  
*Eligmodontia typus*, F. Cuvier, Annales des Sciences Naturelles for March 1837. Tom. 7. p. 169. Pl. 5.

*M. supra flavus, vellere pilis fusciscentibus adperso, his ad latera, et prope oculos rarioribus; pilis pone aurem utramque, labiis, corpore subtus, pedibusque niveis; auribus magnis; caudâ capite corporeque paulo longiore; tarsis longis subtus pilis obsitis.*

DESCRIPTION.—Fur very long and soft; general colour of the upper parts of the body pale brownish yellow; the lower portion of the cheeks, and the under parts of the body pure white: the hairs of the ordinary fur of the back are gray at the base, pale ochre near the apex, and brown at the apex; the longer hairs are brownish. On the sides of the body where the longer hairs are less numerous, the pale ochre colour prevails; the hairs on this part as on the back are deep gray at the base, but at a short distance from the apex they are white; nearer the tip shaded into yellow, and at the tip brownish: the limbs externally are of a pale yellow colour. The hairs of the throat and chest are pure white to the root, those on the belly are obscurely tinted with gray at the root. The feet are of a pale flesh-colour, and furnished with white hairs; the fore feet are of moderate size; the thumb nail is small and rounded, and the carpal tubercle is covered with hairs; the tarsi are long, and the white hairs extend over the whole of the under parts; the under side of the toes, however, are but sparingly furnished. There appears to be but one large tubercle on the under side of the tarsus, and this, which is situated near the base of the toes, is thickly covered with silvery-white hairs. The tail is long, pale brown above, and pale flesh-colour beneath; above, it is furnished with minute brown hairs, and on the under side with white hairs. The ears are rather large, of a pale flesh colour, tolerably well clothed with hairs, which are of a pale yellow colour on the inner side, and white on the outer side—excepting on the fore part, where they are brown. A small tuft of white hairs springs from the base of the ear posteriorly. The hairs of the moustaches are moderate; black at the base, and grayish at the apex.



	In. Lines.		In. Lines.
Length from nose to root of tail . . .	3 7	Length of tarsus . . . . .	0 10
of tail . . . . .	3 9	of ear . . . . .	0 6
from nose to ear . . . . .	1 0		

Habitat, Bahia Blanca, (September.)

Upon comparing the skull (Pl. 34, fig. 2, a.) of *M. elegans* with that of *M. Musculus*, the most evident points of distinction consist in the greater proportionate length of the nasal and frontal bones, and the slenderness of the zygomatic arch in the former animal. Length of skull 11 lines, width 6 lines, distance between front molar and outer side of incisors of upper jaw  $3\frac{3}{8}$  lines, length of nasal bones  $4\frac{3}{8}$  lines.

The dentition is figured in Pl. 34, figs. 2. b, and 2. c.

"Whilst bivouacking one night on shore, amongst some sand hillocks, this mouse, with its tail singed, leapt out of a bush which was placed on the fire. Its hind legs appeared long in proportion to the front, and it did not appear to be very active in endeavouring to make its escape."—D.

*Mus elegans* is about equal in size to *M. Musculus*; the head is larger in proportion than in the latter, the ears are slightly larger, the tail is longer, and so are the tarsi. The large ears, long tail, and comparatively large size of the feet, combined with the greater size of the animal itself, will render it easy to distinguish this species from *M. gracilipes* and *M. bimaculatus*. From the last mentioned animal it moreover differs in having the head larger in proportion, the fur longer, and the colouring of the upper parts of the body somewhat darker. The white fur is almost confined to the under parts of the body, and there is but a small tuft of white hairs behind the ears, whereas in *M. bimaculatus*, the white fur extends considerably on the sides of the body, the outer side of the limbs are white, and there is a large and conspicuous white spot behind each ear.

In *M. elegans* the whole sole of the tarsus and the carpal tubercles are covered with hair. In *Mus bimaculatus* the hinder half of the tarsus only is covered with hair, and in *M. gracilipes* both the hinder half is covered, and there are some scattered hairs extending almost to the two tubercles, which are situated at the base of the longer toes.

The genus *Eligmodontia* of M. F. Cuvier, founded upon a species of mouse from Buenos Ayres, possesses nearly the same characters as the subgenus *Calomys*, established by me in the Proceedings of the Zoological Society for February 1837, and which included the animal above described, and two other species (*M. bimaculatus* and *M. gracilipes*). M. Cuvier's genus is distinguished by there being only one large tubercle on the under side of the tarsus, and in having the carpal pad covered with hair as well as the pad of the tarsus. In

these characters our present animal agrees, as it does also in size and in the relative proportions of the tail and tarsus, circumstances which induce me to believe they are identical.

In *M. bimaculatus* and *M. gracilipes* there are six naked tubercles on the under side of the tarsus, and the carpal pad is also naked. In having, however, the tarsus hairy beneath,\* in dentition and in colouring, they agree so closely with *M. elegans* that I think they cannot be separated generically.

### MUS BIMACULATUS.

#### PLATE XII.

*Mus bimaculatus*, Waterh., Proceedings of the Zoological Society of London for February 1837, p. 18.

*M. vellere pallidè ochraceo, pilis nigricantibus adperso, his ad latera rarioribus; rostri lateribus, notâ magnâ pone aurem utramque, artubus, corporeque subtus niveis; auribus mediocribus; caudâ, quoad longitudinem, corpus fere æquante; tarsis ad calcem pilis argenteo-candidis obsitis.*

DESCRIPTION.—Upper parts of the body of a very pale ochre colour, the longer hairs, however, are black, and at the apex grayish, and where they are numerous, as on the back and upper surface of the head, they give greater depth to the colouring; the cheeks and sides of the body are of an almost uniform pale, but bright yellow; the sides of the muzzle, the lower half of the cheeks, the lower portion also of the sides of the body, and the whole of the under parts, are pure white—each hair being uniform in colour to the root, and not, as is usually the case, gray at the root. There is likewise a large patch of pure white hairs behind each ear. The feet and tail are of a pale flesh-colour, and furnished with white hairs, with the exception of those on the upper surface of the latter, which are pale brown. The ears are also pale flesh-colour, clothed internally with yellow hairs; externally on the fore part, the hairs are brownish, and on the hinder part, white—they are rather large, and so are the feet. The tail is about equal to the body in length. The hairs of the moustaches are numerous and slender, and most of them are black at the base, and gray at the apex. The hinder half of the tarsus

\* In *Mus leucopus* of North America the tarsus is hairy beneath, and in the character of the teeth this animal also agrees with the species above mentioned.



beneath is covered with minute silvery-white hairs; beside the ordinary tubercles, the anterior portion of the sole of the foot and the base of the toes beneath, are crowded with small rounded warts, which are much more numerous and conspicuous than in the common mouse.

	In. Lines.		In. Lines.
Length from nose to root of tail . . .	3 1	Length from nose to base of ear . . .	0 8 $\frac{3}{4}$
of tail . . . . .	1 11	of tarsus (claws included) . . .	0 8
from nose to eye . . . . .	0 4 $\frac{1}{2}$	of ear . . . . .	0 4 $\frac{1}{2}$

Habitat, Maldonado, La Plata, (June.)

The skull of this animal, is rather shorter and broader than that of *Mus Musculus*, the upper surface is more arched, the zygomatic arch is much more slender, and the nasal bones are rather broader. In the convexity of the upper surface, and the slenderness of the zygomatic arch, this skull very nearly resembles that of *M. gracilipes*; this latter, however, has the zygomatic arch more convex, projecting more suddenly on the anterior part, and the interparietal bone smaller. Length of skull 10 lines, width 5 $\frac{1}{2}$ , length of nasal bones 4 lines, distance between the outer side of the incisors, of the upper jaw, and the first molar 2 $\frac{7}{8}$  lines. See Plate 34, fig. 3. *a*.

The dentition is figured in Plate 34, figs. 3. *b* and *c*.

This mouse is rather less than *M. Musculus*, the tail is much shorter in proportion, the fur is longer and softer, and the ears are more distinctly clothed with hair.

The pale and delicate yellow colour of the upper parts of the body, and the pure white of the under parts, renders the present species conspicuous amongst its congeners. I may further remark that the white colour which in the Muridæ (when it occurs) is usually confined to the under part of the body, or extends but slightly on the sides, is in the present animal extended considerably on the sides of the body, and occupies an equal portion with the yellow of the upper parts. The name *bimaculatus* is applied to this animal on account of the two conspicuous white patches, which are situated behind the ears.

In affinity as well as in appearance it most nearly approaches to *Mus gracilipes* and *M. elegans*; with no other species of the genus *Mus*, here described, can it be confounded, since these only have the tarsus hairy beneath.

The principal points of distinction between the present animal and *Mus elegans*, are noticed in the account of that species.

"This mouse, when alive, had a very elegant appearance. A countryman, who brought it me, found six of them living together in one burrow."—D.

## MUS GRACILIPES.

## PLATE XI.

*Mus gracilipes*, *Waterh.*, Proceedings of the Zoological Society of London, for February 1837, p. 19.

*M. supra flavo-lavatus; pilis pone aurem utramque, labiis, corporeque subtus, albis; pedibus parvulis, gracilibus, carneis, supra et ad calcem pilis albis tectis; caudâ gracili, pilis albis instructâ, quoad longitudinem corpus ferè æquante; auribus mediocribus; vellere mediocri et molli, pilis omnibus ad basin plumbeis.*

DESCRIPTION.—General colour very pale yellowish brown, a tint produced by the admixture of black and pale fawn colour; the hairs of the ordinary fur being of the latter tint near the apex, and dusky at the apex, whilst the longer hairs are black. The feet, tail, under parts of the body and the sides of the muzzle, are pure white. All the hairs of the body, (which are soft, and of moderate length), are deep gray at the base. The ears are of moderate size, well clothed with hairs, of which those on the inner side are yellowish, and those on the outer, are brown on the anterior part, and white on the posterior. A small tuft of white hairs springs from the neck immediately behind the ears; this tuft is hidden when the ears are folded back. The tail is slender and short, (being not quite equal to the body in length) of a pale flesh-colour, and sparingly furnished with minute white hairs. The feet are very small and slender, and the naked parts are of a pale flesh-colour. The sole of the foot is covered with hairs; the toes beneath, and the tubercles (which are as in *Mus Musculus*), however, are naked. The hairs of the moustaches are of moderate length, and of a blackish colour, some of them, however, are grayish white.

	In. Lines.		In. Lines.
Length from nose to root of tail . . .	2 10	Length from nose to ear . . .	0 8 $\frac{1}{4}$
of tail . . . . .	1 7	of tarsus (claws included) . . .	0 6 $\frac{1}{2}$
from nose to eye . . . . .	0 4 $\frac{1}{3}$	of ear . . . . .	0 4 $\frac{1}{4}$

Habitat, Bahia Blanca, (September.)

This species slightly exceeds the harvest mouse (*Mus messorius*) in size, its ears are considerably larger in proportion, and the tail is shorter. Compared with the common mouse (*Mus Musculus*) it is smaller, the tail is more slender, and shorter, and the feet are likewise more slender and proportionately much smaller; the ears are more distinctly clothed with hairs.



The principal points of distinction between this and the two preceding species are pointed out in the account of *M. elegans*.

Upon comparing the skull of *M. gracilipes* (Pl. 34, fig. 4. *a.*) with that of *Mus Musculus*, the most striking differences consist in its shorter and broader form, the upper surface being more arched, the interparietal bone has a relatively smaller antero-posterior diameter, the occipital region is more convex, and continued more gently and gradually into the upper region of the skull. The zygomatic arch, which is unusually slender, is more dilated (especially on the anterior part) thus giving a squareness to the general form. The nasal bones are not so much attenuated posteriorly. The length of the skull is  $8\frac{7}{8}$  lines, the greatest width is  $5\frac{1}{8}$  lines, and the distance between the outer side of the incisors and the front molar is  $2\frac{3}{4}$  lines.

The dentition is figured in Plate 34, figs. 4. *b* and 4. *c*.

"This specimen was given me by Mr. Bynoe, the surgeon of the Beagle, who caught it amongst some long dry grass."—D.

#### MUS FLAVESCENS.

##### PLATE XIII

*Mus flavescens*, *Waterh.*, Proceedings of the Zoological Society of London, for February 1837, p. 19.

*M. supra colore cinnamomeo, lateribus capitis, corporisque, æquè ac pectore, auratis; gulâ abdomineque flavescenti-albis: pedibus sordidè albis: auribus mediocribus rotundatis, pilis flavis obsitis: caudâ, corpore, capiteque longiore, suprâ fuscâ, subtùs sordidè albâ: tarsis longis.*

DESCRIPTION.—Fur long and moderately soft; general colour of the upper parts bright brownish yellow; on the sides of the head and body bright yellow; towards the rump of a deeper hue, and inclining to orange; under parts pale yellow, or yellow-white; chest yellow. The fur both of the upper and under parts of the body deep plumbeous at the base. Feet flesh colour, covered above with white hairs: tarsi long, naked beneath. Ears small, tolerably well clothed with hairs; those on the inner side yellow, but many of them blackish at the base; on the outer side, the hairs are blackish on the fore part and yellow on the hinder part. The hairs of the ordinary fur of the back are of a deep rich yellow colour at the tip, and the longer hairs are blackish. The tail is long, deep brown above and whitish beneath; the hairs of the

moustaches are rather short and slender, and of a brownish colour. Thumb nail small and rounded.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	3	9	Length of tarsus . . . . .	1	$0\frac{1}{2}$
of tail . . . . .	4	$1\frac{1}{2}$	of ear . . . . .	0	$4\frac{1}{2}$
from nose to ear . . . . .	1	0			

Habitat, Maldonado, La Plata, (*June.*)

This species is slightly larger than the common mouse; the head is rather larger in proportion; the ears are rather smaller and more distinctly clothed with hair; the tail and tarsi are much longer in proportion. Its bright yellow colouring and proportions distinguish it from any of the species described in this work. Of this animal I do not possess the skull, nor of the teeth do I possess more than the first and second molars of the upper jaw, and the second and last of the lower jaw. These are figured in Plate 34, figs. 5. *a*, and 5. *b*.

#### MUS MAGELLANICUS.

##### PLATE XIV.

*Mus Magellanicus*, *Bennett*, Proceedings of the Zoological Society of London for December 1835, p. 191.

*M. suprâ fuscus, subtùs cinerescenti-albus, pallidè flavo lavatus; auribus mediocribus pilis fuscis obsitis; caudâ corpus caputque æquante; tarsis longis, pilis sordidè albis obsitis.*

DESCRIPTION.—Fur very long and moderately soft, general colour deep brown; the hairs of the ordinary fur are gray, tipped with yellowish brown; the longer hairs are black; the sides of the body are yellowish; the under parts are gray-white with a faint yellowish tint, each hair being gray tipped with yellowish white. The ears are rather small, well clothed with hairs; those on the inner side are blackish tipped with yellow, and on the outer side they are blackish on the fore part and dusky on the hinder part. The fore feet are of moderate size, the thumb nail is short and rounded; the tarsi are rather long; both fore and hinder feet are of a brownish colour, and covered above with dirty gray hairs. The tail rather exceeds the head and body in length; it is brown above and dirty white beneath. The hairs of the moustaches are numerous and long, of a brownish colour at the apex and black at the base.



	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	4	3	Length of tarsus . . . . .	1	1
of tail . . . . .	4	2	of ear . . . . .	0	5
from nose to ear . . . . .	1	0½			

Habitat, Port Famine, Strait of Magellan.

This mouse is larger than *Mus Musculus*; the tail is rather longer in proportion; the tarsi much longer; the ears are not quite so large in proportion to the head, (which greatly exceeds that of *Mus Musculus* in size,) and they are densely clothed with hair. The fur is longer. In colour, the animal here described is rather darker than the common mouse. I have one specimen however before me which *very nearly* agrees in this respect.

The dentition is figured in Plate 34, figs. 6, *a.* and 6, *b.*

From the attention which Mr. Darwin bestowed upon the Muridæ of the southern parts of South America, I presume his collection affords materials for a tolerably complete monograph of the species of that portion of the globe. The species above described, however, does not occur in Mr. Darwin's collection, but is here introduced in order to make the work more complete, and that I might more clearly point out the distinctions which exist between it and other species here described, the account given by Mr. Bennett in the Proceedings being very short.

#### MUS ARENICOLA.

##### PLATE XIII.

*Mus arenicola*, *Waterh.*, Proceedings of the Zoological Society of London, for February 1837, p. 18.

*M. supra fuscus, subtus cinerescens-albus, pallidè flavo tinctus; auribus mediocribus rotundatis, pilis flavis fuscisque obsitis; caudâ quoad longitudinem corpus æquante; pedibus cinerescens-albis: tarsi mediocribus.*

DESCRIPTION.—Fur long, moderately soft; general colour deep brown; sides of the body with a very obscure yellowish hue; under parts dirty gray with a faint yellow tint. All the fur deep gray at the base; the hairs of the upper part of the body obscurely annulated with yellowish brown near the apex, and dusky at the apex; the longer hairs are black. Feet brownish, covered above with brown-white hairs; tarsi short. Tail short, blackish above, brown-white beneath. Ears small, well clothed with hairs; those on the

inner side are yellow at the apex and gray at the base; on the outer side they are of a brownish colour, and on the fore part blackish. The hairs of the moustaches are short and slender, and of a brownish colour. The head is large.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	4	3	Length of tarsus (claws included) . . . . .	0	10
of tail . . . . .	2	9	of ear . . . . .	0	4½
from nose to ear . . . . .	1	0			

Habitat, Maldonado, La Plata, (*June.*)

This species is rather larger than the common mouse; its head is proportionately larger, the ears are smaller, the tail considerably shorter, and the fur longer, and in colouring it is a little darker. In size and colour it resembles *M. Magellanicus*, but the shorter tail and tarsi, and the smaller size of the ears will serve to distinguish it.

The skull of *Mus arenicola*, Plate 34, fig. 7, *a.* is rather larger than that of *Mus Musculus*, the nasal portion is broader, the interparietal bone is much smaller, especially in antero-posterior extent; the zygomatic arches are more slender, and the incisive foramina are broader. The horizontal ramus of the lower jaw (Pl. 34, fig. 7, *d.*) is rather less curved, the coronoid process is more elongated, and the condyloid is narrower and also larger. The length of the skull is 11 lines and a half; the width is 6½ lines. The molars of the upper jaw are figured in plate 34 fig. 7, *b.* and those of the under jaw, fig. 7, *c.*

"This specimen was caught on the open grassy plain, by a trap baited with a piece of bird; it is, however, very abundant in the sand hillocks near the coast of the Plata."—D.

#### 13. MUS BRACHIOTIS.

##### PLATE XIV.

*Mus brachiotis*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 17.

*M. supra obscure fuscus, subtus obscure griseo tinctus; pedibus griseo-fuscis; auribus parvulis; caudâ quoad longitudinem, corpus ferè æquante: vellere longo et molli.*

DESCRIPTION.—Fur soft, very long, and dense; ears very small; general colour brown: the hairs of the upper parts, and sides of the head and body are of

H



a deep gray at the base, black at the apex, and narrowly annulated with deep yellow near the apex; on the throat and belly they are of a paler gray at the base, and grayish white at the apex. The ears are well clothed with brown hairs both within and without, and are for the most part hidden by the long fur of the head. The hairs covering the upper side of the feet are of a palish ashy-brown colour, and the fleshy portion appears to have been brown. The tail is well clothed with hairs, so that the scales are scarcely visible; on the upper side of the tail the hairs are brownish-black, and on the under side, they are dirty white. The incisors are very slender; those of the upper jaw are of a very pale yellow colour, and those of the lower are white, or nearly so. The muzzle is slender, and pointed.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	4	9	Length of tarsus (claws included)	0	11
of tail	2	8	of ear	0	3
from nose to base of ears	1	2			

Habitat, Chonos Archipelago, (*December.*)

This mouse is considerably larger than *Mus Musculus*, and the great length and density of its fur, causes it to appear much stouter in its proportions; its colouring is darker, the tips of the hairs being much more narrowly annulated with yellow than in that species. The very small size of the ears will serve to distinguish the present animal from its congeners—*Mus longipilis*, *M. Renggeri*, *M. arenicola*, &c.

The molar teeth of the upper jaw are figured in Plate 34. fig. 8, *a*; and fig. 8, *b*, represents the middle and last molars of the lower jaw.

"Inhabited a very small island, covered with thick forest, in the central part of the Chonos Archipelago."—D.

A mouse obtained on the islets adjoining the east coast of Chiloe (where Mr. Darwin says it was common) differs from the above in being a little smaller, the tail is rather longer, and the ears are a trifle larger. In the feet, claws, colouring and character of the fur it agrees, and likewise in the pale colour and slenderness of the incisors. Its dimensions are as follows:—

	In.	Lines.		In.	Lines.
Length from nose to root of tail	4	0	Length from nose to ear	0	10½
of tail	3	0	of ear	0	4
of tarsus (claws included)	0	10			

I have not the means of satisfying myself whether this be a distinct species or not; but I think it is not.

"The nature of the country where this specimen was procured is nearly the same as in that part of the Chonos Archipelago, 150 miles to the south, where the first was obtained." D.

#### 14. *MUS RENGGERI.*

PLATE XV.—Fig. 1.

*Mus olivaceus*, *Waterh.*, Proceedings of the Zoological Society of London, for February 1838, p. 16.

*M. corpore supra subolivaceo, subtilis cinerescens; auribus mediocribus, rotundatis, pilis parvulis fusciscentibus obsitis; caudā corpore breviorē, pilosā, supra fuscā subtilis albescente; pedibus pilis fusciscentibus tectis.*

DESCRIPTION.—Fur moderate; ears moderate; tail shorter than the body; general colour gray washed with yellow; under parts grayish white. On the upper parts and sides of the head and body the hairs are gray, broadly annulated with yellow near the apex, and dusky at the apex; the mixture producing a yellowish gray tint, approaching somewhat towards olive:—the hairs on the under parts of the body and throat are deep gray at the base, and white at the apex; the hairs of the feet are brownish white. The tail is tolerably well clothed with hairs; those on the upper surface are brown, and those on the under are dirty white. The ears are well clothed, both externally and internally, with hairs of the same colour as those on the upper parts of the body. The hairs of the moustaches are for the most part whitish, and black at the base. The upper incisors are pale yellow, and the lower incisors are yellowish white.

	In.	Lines.		In.	Lines.
Length from nose to the root of tail	5	1	Length of tarsus (claws included)	0	11
of tail	2	8	of ear	0	5
from nose to base of ears	1	2			

Habitat, Valparaiso (*August and September.*) Coquimbo (*May.*)

Subsequent to the description of this species, under the name of *M. olivaceus* in the Zoological Society's Proceedings, I have imagined that perhaps that name might mislead as regards the colouring of the animal;—it certainly has a slight olive hue, but it is not very evident. I have therefore changed the name, and substituted that of the author of the "Naturgeschichte der Säugethiere von Paraguay," &c.



In the collection there are three specimens of the present species; in one of these the hairs of the upper part and sides of the body are annulated with yellowish white, instead of yellow; hence the general hue of these parts is nearly gray.

*Mus Renggeri* is larger than *Mus Musculus*, and much stouter in its proportions; the fur is shorter, much less dense, and less soft than in *Mus brachiotis*.

"It inhabits dry stony places, where only a few thickets grow."—D.

#### 15. MUS OBSCURUS.

PLATE XV.—Fig. 2.

*Mus obscurus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 16.

*M. supra fusco-nigrescens, subtus flavescens; pedibus obscure fuscis; unguibus longiusculis; auribus mediocribus; caudâ corpore brevior, supra nigrescente, subtus sordide albâ; vellere mediocri, molli.*

DESCRIPTION.—Head large; ears moderate; tail shorter than the body; fur rather long and glossy; the general hue of that of the upper parts and sides of the head and body is blackish brown, and that of the under parts is dirty yellowish white. The hairs on the upper parts are of a deep lead colour at the base, black at the apex, and narrowly annulated with dark yellow near the apex; those of the throat and belly are lead colour at the base and yellowish at the tip; the chin is white: around the eye, and on the lower part of the cheeks a deep yellow tint prevails. The ears are well clothed with hairs both externally and internally, and these are for the most part of a deep brown colour, as are also the hairs which cover the feet. The tail is well clothed with hairs, those on the upper surface are black, and those on the under are dirty white. Both upper and lower incisors are yellow, but the lower are paler than the upper.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	5	3	Length of tarsus (claws included)	0	11½
of tail	2	7	of ear	0	4
from nose to ears	1	2½			

Habitat, Maldonado, La Plata, (*June.*)

The present species, like the foregoing, is much stouter than the common

mouse (*Mus Musculus*), its colour is much darker. In possessing a glossy fur it differs from most of its congeners; its head is also proportionately larger, and the incisors are much stronger.

The molars of the upper jaw are figured in plate 34, fig. 9, *a*,—and fig. 9, *b*, represents those of the under jaw.

"Very abundant in gardens and hedges, far from houses; and was easily caught in traps baited either with cheese or meat."—D.

#### 16. MUS XANTHORHINUS.

PLATE XVII.—Fig. 1.

*Mus xanthorhinus*, *Waterh.*, Proceedings of the Zoological Society of London, for January 1837, p. 17.

*M. supra fuscus flavo lavatus; subtus albus; rhinario flavo; auribus parvulis, intus pilis flavis obsitis; mystacibus longis, canis, ad basin nigrescentibus; caudâ corpore brevior, supra fuscâ, ad latera flavescente, subtus sordide albâ; pedibus anticis, tarsisque flavis, digitis albis; vellere longo, molli.*

DESCRIPTION.—Fur moderately long and loose; ears rather small; tail shorter than the body; general colour gray washed with yellow, the yellow colour prevailing, especially on the sides of the body; muzzle, inner side of ears, and tarsus, of a rich yellow colour; toes, chin, throat, under parts of body, and rump, white; all the fur deep gray at the base; the hairs on the upper parts and sides of the body broadly annulated near the apex with rich yellow, and at the apex dusky; on the under parts of the body the hairs are broadly tipped with white. Tail rather sparingly furnished with hair, that on the upper surface brown, on the sides yellow, and on the under surface whitish. The hairs of the moustaches are white—some of them dusky at the base. The incisor teeth are rather slender, and of a pale yellow colour.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	3	6	Length of tarsus (claws included)	0	9
of tail	1	7½	of ear	0	3½
from nose to ear	0	10			

Habitat, Hardy Peninsula, Tierra del Fuego, (*February.*)

The white, which is usually confined to the under parts of the body, in this



species extends slightly on the sides of the body, and the lower portion of the cheeks.

"This species was caught on the mountains, thickly covered with peat, of Hardy Peninsula, which forms the extreme southern point of Tierra del Fuego."—D.

#### 17. MUS CANESCENS.

*Mus canescens*, *Waterh.*, Proceedings of the Zoological Society of London for February, 1837, p. 17.

*M. suprà canescens, subtùs albus; oculis flavido cinctis; auribus parvulis, pilis pallidè flavis et plumbeis obsitis; mystacibus mediocribus, canis, ad basin nigricantibus; caudà vix corpore brevior, suprà fusco-nigrà, subtùs sordidè albà; pedibus anticis tarsisque flavescentibus.*

DESCRIPTION.—Fur moderately long and loose; ears small; tail nearly equal to the body in length: general colour gray, with a wash of very pale yellow; chin, throat, and under parts of the body, white. Tail tolerably well clothed with hairs, those on the upper surface brown, and those on the under, whitish; on the sides are some yellowish hairs. Ears with yellow hairs on the inner side; tarsi pale yellow, toes white; muzzle and around the eye yellowish.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	3	6*	Length of tarsus (claws included)	0	9½
of tail	2	1	of ear	0	4
from nose to ear	1	1			

Habitat, Santa Cruz and Port Desire, (*December.*)

"Very common in long dry grass in the valleys of Port Desire."—D.

The skull is figured in Plate 33, fig. 5, *c.* Fig. 5, *a.* represents the molars of the upper jaw; fig. 5, *b.* those of the under jaw, and fig. 5, *d.* represents the posterior molar of the under jaw when more worn.

It was with some hesitation that I described this as a distinct species in the Society's Proceedings. I have now re-examined the specimens, and still am

\* The dimensions given in the Proceedings of the Zoological Society were taken from a younger specimen than those here described, and there is an error in the length of the tail there given, which should be 1—10 instead of 2—10.

unable to satisfy myself whether they are varieties of *Mus xanthorhinus* or not. Both of *Mus canescens* and of *Mus xanthorhinus*, I have before me what I imagine to be an adult and a young specimen. The adult and the young of *M. xanthorhinus* agree in being of a yellowish-brown colour, and in having the muzzle and tarsi deep yellow; both specimens of *Mus canescens* are of a gray colour, with an indistinct yellow wash, the muzzle and tarsi being tinted with yellow, as in *M. xanthorhinus*. Besides this difference in tint, which, perhaps, is unimportant, *M. canescens* differs from *M. xanthorhinus* in having the head larger, the tail rather longer, and the fur less soft. The specimens of this animal are both from Patagonia; one of the specimens of *Mus xanthorhinus* was brought by Mr. Darwin from Terra del Fuego; and as the other formed part of Captain King's collection, it in all probability came from the same locality. As I only possess one skull, I cannot speak with certainty as regards the size of the head; the difference, however, in the stuffed specimens is considerable, and it is strange that each of the pairs should agree so perfectly, supposing the difference to be the work of the stuffer's hands.

#### 18. MUS LONGIPILIS.

PLATE XVI.

*Mus longipilis*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 16.

*M. suprà obscurè griseus, flavo lavatus; subtùs griseus; pedibus fuscis, unguibus longiusculis; auribus mediocribus; caudà corpore brevior, suprà nigrescente, subtùs fuscescente; rhinario sub-producto: vellere longissimo, molli.*

DESCRIPTION.—Fur very soft and silky, and extremely long—the ordinary fur of the back measuring nearly three quarters of an inch, and the longer hairs one inch in length; ears moderate; tail nearly as long as the body; muzzle much pointed; general colour gray, washed with yellow, the under parts pale gray, or grayish white; feet brown; ears and tail well clothed; the hairs on the inner side of the ears are chiefly of a yellow colour, those on the upper surface of the tail are brown black, those on the under part are dirty white; the hairs of the back are deep gray at the base, broadly annulated with yellow near the apex, and dusky at the apex; the longer hairs are grayish black; the hairs of the moustaches are dusky at the base, and whitish beyond that part; the claws are long, and but slightly curved; the



incisors are slender; those on the upper jaw are yellow, and those of the under yellow-white.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	5	4	Length of tarsus (claws included) . . .	1	0½
of tail . . . . .	3	4	of ear . . . . .	0	6½
from nose to ear . . . . .	1	2			

Habitat, Coquimbo, Chile, (*May*.)

This mouse is remarkable for the great length and softness of its fur, even among the species here described, most of which have very loose, long and soft fur.

The molars of the upper jaw are figured in Plate 33, fig. 6, *b*.—molars of the lower jaw, fig. 6, *a*.

“Inhabits dry stony places, which character of country is general in this part of Chile.”—D.

#### 19. MUS NASUTUS.

PLATE XVII.—Fig. 2.

*Mus nasutus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 16.

*M. supra obscure flavescenti-fuscus, ad latera fulvens; subtus obscure fulvo tinctus: pedibus pilis obscure fuscis tectis; unguibus longis; auribus mediocribus; caudâ corpore brevior, supra fuscâ, subtus sordidè albâ: rhinario producta.*

DESCRIPTION.—Muzzle very long and pointed, ears small, tail shorter than the body, claws long and but slightly arched; inner, rudimentary toe of the fore foot furnished with a pointed claw; fur moderate, and slightly glossy: general colour yellowish brown, of the sides of the body yellow, of the under parts pale yellow; the chin, throat and chest whitish: feet brown; ears well clothed with hairs, those on the inner side are most of them yellow, but some are black. All the fur is of a deep lead colour at the base; the hairs on the upper parts and sides of the head and body are broadly annulated with deep golden yellow near the apex, and blackish at the apex; on the upper parts long brownish black hairs are thickly interspersed with the ordinary fur, but on the side of the body they are less numerous, hence on this part

the yellow tint prevails; on the under parts of the body the hairs are broadly tipped with pale yellow, and in parts with white: the tail is but sparingly clothed with hairs, those on the upper surface are of a dark brown colour, and those on the under are pale brown. The incisors are very slender and of a very pale yellow colour.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . .	5	2	Length of tarsus (claws included) . . .	1	0½
of tail . . . . .	2	8	of ear . . . . .	0	5
from nose to ear . . . . .	1	3			

Habitat, Maldonado, La Plata, (*June*.)

The specific name *nasutus* has been applied to this mouse on account of its elongated and slender muzzle\*, the tip of which extends nearly 4 lines beyond the upper pair of incisors: the rudimentary toe of the fore foot, instead of having the usual rounded nail, has a short pointed claw. Its fur is not so soft, nor yet so long as in many of the preceding species, and there is a greater admixture of yellow in its colouring. The claws appear to be adapted to burrowing.

The skull (which is not quite perfect) is figured in Plate 33, fig. 7, *a*, its length is 1 in. 3 lines. Fig. 7, *b*, represents the molars of the upper jaw, and fig. 7, *c*, those of the under jaw. The lower jaw, which is of a very slender and elongated form, is figured in Plate 34, fig. 10, *a*.

“Was caught in a small thicket on an open grassy plain, by a trap baited with a piece of bird. This mouse when alive possesses a marked character in the extreme acumination of its nose.”—D.

#### 20. MUS TUMIDUS.

PLATE XVIII.

*Mus tumidus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 15.

*M. brunneus, nigro lavatus; rostro ad apicem, labiis, mento, gulâ, pectore, abdomineque albis; naso supra nigrescente; auribus mediocribus rotundatis; corpore crasso; caudâ capite corporeque brevior, pilis nigricantibus, subtus albescentibus prope basin, vestitâ; artubus pedibusque grisescentibus; vellere longo, molli; unguibus longis.*

DESCRIPTION.—Body stout; head large; tail nearly as long as the head and body;

\* In *Mus longipilis* and *M. brachiotis* may be perceived an approach to this elongated form of the muzzle.



inner toe of the fore foot with a distinct, pointed claw; claws rather large, those of the fore feet but slightly arched. Fur rather long, and moderately soft; general tint of the upper parts of the body, brown, of the sides of the head and body, grayish, but with a yellow wash; the lower part of the sides of the body and of the cheeks, the tip of the muzzle, and the whole of the under parts, white; feet dirty white; ears densely clothed with short hairs, those on the inner side chiefly of an ashy-brown colour, and those on the outer side dusky; the hairs of the back are of a deep lead colour at the base, black at the tip, and annulated with yellow near the tip; the longer hairs, which are thickly interspersed, are totally black; on the under parts of the body the hairs are gray at the base, and broadly tipped with white; the upper surface of the muzzle is blackish; the moustaches are black; the incisors are yellow.

	In.	Lines.		In.	Lines.
Length from nose to the root of tail	6	9	Length of tarsus (claws included)	1	6
of tail	5	4	of ear	0	7
from nose to ears	1	8			

Habitat, Maldonado, La Plata (*June.*)

This species is about the size of *Mus Rattus*, but is stouter in its proportions; as in *Mus nasutus*, the thumb is furnished with a pointed claw. The molars of the lower jaw are figured in Plate 34, fig. 11, *a.*

"This rat was caught in so wet a place amongst the flags bordering a lake, that it must certainly be partly aquatic in its habits."—D.

## 21. MUS BRAZILIENSIS.

PLATE XIX.

Rat du Brésil, Geoff.

*M. supra fuscus fulvo lavatus; lateribus capitis corporisque æquè ac abdomine auratis; gula pectoreque albis; pedibus pilis sordide flavis tectis; auribus parvulis; caudâ caput corpusque ferè æquante; vellere longo, molli.*

DESCRIPTION.—Head somewhat arched, and rather short; ears small; tail about equal in length to the head and body, measured in a straight line; tarsi large. Fur long, and rather soft; general colour deep golden yellow: on the upper surface of the head and the back, long glossy black hairs are thickly interspersed, and produce, with the admixture of the deep golden

colour of the ordinary fur, a dark brown tint; chin, throat, chest, and rump, white; the hairs covering the upper surface of the feet are of a dirty yellowish-white colour, and on the toes nearly white: ears densely clothed with longish hairs, those on the inner side chiefly of a deep golden colour, and those on the outer side brownish; the ears are partially hidden by the long fur of the head; tail sparingly clothed with hairs, above brown, and beneath brownish-white: the fur of the back is of a deep gray colour at the base, annulated with deep golden yellow near the apex, and blackish at the apex; the longer hairs are black; the hairs of the belly are pale gray at the base, and broadly tipped with golden yellow colour; the white hairs on the throat, chest, and rump are of an uniform colour—not tinted with gray at the root;—the hairs of the moustaches are black: the incisors of the upper jaw are of a deep orange colour, and those of the lower jaw are yellow: the thumb nail is truncated.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	8	6	Length of tarsus	2	0
of tail	7	9	of ear	0	6½
from nose to ear	1	8			

Habitat, Bahia Blanca, (*September.*)

This species is nearly equal in size to the common rat (*Mus decumanus*). Of its skull \* I possess but the anterior portion (see Pl. 33. fig. 3, *a.* and 3, *b.*): it appears to have been about the same size as that of *M. decumanus*, its proportions, however, are different: the nasal portion is broader and shorter, the ant-orbital outlet is rather smaller; the plate, forming the anterior root of the zygomatic arch, and which protects this outlet, has its anterior edge distinctly emarginated, and not nearly straight as in *M. decumanus*,—the zygomatic arch is stouter, the space between the orbits is narrower, the palate is more contracted, the incisors are much broader, less deep from front to back, and have the anterior surface more convex; the molar teeth are larger; the lower jaw (see Plate 34. fig. 12, *a.*) when compared with that of *Mus decumanus* also offers many points of dissimilarity; the principal differences consist in its greater strength, the comparatively large size and breadth of the articular surface of the condyles, the upright position of the coronoid process—a perpendicular line dropt from the apex of which would touch the posterior part of the last molar—and the great

\* I am sorry to say the artist has not drawn this skull with his usual fidelity, a circumstance which I did not perceive until it was too late to make any alteration: it is too large, and the incisors are represented as projecting forwards too much; they are in the original so nearly at right angles with the upper surface of the skull that but a very small portion of them is seen, when it is viewed, as represented at fig. 3, *a.*



extent of the *symphysis menti*. In the form of the incisors, the more contracted palate, the great extent of the *symphysis menti*, and in fact in most of the points of dissimilarity, between the skull of the present animal and that of *Mus decumanus*, here pointed out, it will be perceived, there is an approach made to the *Arvicolidæ*.

The dimensions of the skull (so far as an imperfect specimen will allow of their being taken) are as follows:—

	In.	Lines.
Distance between front of incisors, (upper jaw) and the first molar tooth	0	8
Longitudinal extent of the three molars on either side, taken together	0	4½
Length of nasal bones	0	7½
— of incisive foramina	0	4½
Width between orbits	0	2½
Length of <i>ramus</i> of lower jaw	1	1½

Fig. 3, c, Plate 33, represents the molar teeth of the upper jaw. Fig. 3, d, those of the upper jaw.

“This rat was caught at Bahia Blanca where the plains of Patagonia begin to blend into the more fertile region of the Pampas. It lived in holes amongst the tussocks of rushes, on the borders of a small, still, brook; in its manner of diving and aquatic habits it closely resembled the English water-rat, (*Arvicola amphibia*.)”—D.

When at Paris I examined what I believe to be the original *Mus Braziliensis*, since the specimen was labelled “*Rat de Brazil St. Hilaire, 1818.*” It agrees perfectly with the present animal excepting in being rather smaller, the length from the nose to the tail being 7 inches and 4 lines—the length of the tail is 7 inches 9 lines, and that of the tarsus is 1 inch 11 lines; this difference in the length of the body may arise from difference of age, or even of sex. In the Paris Museum I saw what appeared to me to be a variety of the same species in which the under parts of the body are white.

I have been minute in my description of the *Mus Braziliensis*, since it is confounded by Desmarest, Fischer and Lesson with the *Rat troisieme* or *Rat Angouya* of Azara, which I believe to be a very different animal. The description given by the authors just mentioned are taken from Azara, who gives the following characters to distinguish the Rat Angouya: “Du museau à la queue, et sur les côtés du corps tout est brun-cannelle, parceque les poils ont une petite pointe cannelle; puis, ils sont obscurs et enfin blanc vers las peau. Toute la partie inférieure de l’animal est blanchâtre, plus claire sous la tête, et plus foncée entre les jambes de devant; le pelage est doux, très-serré, et le poil, qui est à la racine de l’oreille, cache le conduit de celle-ci.”

	In.	Lines.		In.	Lines.
Length from nose to root of tail (English measure)	6	0	Length of ears	0	9½
of tail	6	6½	of tarsus (the claws included)	1	3½

It appears from this description that the *Mus Angouya* is a smaller animal, and differs both in colouring and proportions from the *Mus Braziliensis*. Brandt has figured and described a rat under the name of *Mus Angouya*, which in many respects agrees better with Azara’s description; there are, however, discrepancies in the dimensions.

## 22. MUS MICROPUS.

### PLATE XX.

*Mus micropus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 17.

*M. supra fuscus; subtus cinerescens-albus, pallidè flavo tinctus; pedibus pilis sordidè albis tectis, antipedibus parvulis; auribus parvulis; caudâ, quoad longitudinem, corpus ferè æquante, supra fuscâ, subtus sordidè albâ.*

DESCRIPTION.—Form stout, ears rather small, tail nearly equal to the body in length, fur very long and moderately soft, general colour of the upper parts of head and body, brown; of the sides of the body grayish, faintly washed with yellow, of the under parts grayish white, faintly tinted with yellow; hair covering the upper surface of the feet dirty white; on the tarsus there is a very slight yellow tint; ears well clothed with hairs, those on the inner side chiefly of a yellow colour; tail above, dusky brown; beneath dirty white: hairs of moustaches black at the base and grayish at the apex; incisors pale yellow: hairs of the back deep gray at the base, annulated with brownish yellow near the apex, and dusky at the apex; longer hairs dusky black; hairs of the belly deep gray at the base and broadly tipped with yellowish white.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	0	Length of tarsus (claws included)	1	0½
of tail	3	8	of ear	0	6
from nose to ear	1	4			

Habitat, Santa Cruz, Patagonia, (*April.*)



The molars of the upper jaw are figured in Plate 34, fig. 13, *a*, and those of the lower jaw, fig. 13, *b*.

"Caught in the interior plains of Patagonia in lat. 50°, near the banks of the Santa Cruz."—D.

## 23. MUS GRISEO-FLAVUS.

## PLATE XXI.

*Mus griseo-flavus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 28.

*M. supra griseus flavo-lavatus, ad latera flavus, subtus albus; pedibus albis; auribus magnis et ferè nudis; caudà caput corpusque ferè æquante, supra fusco-nigricante, subtus albà; vellere longo, molli.*

DESCRIPTION.—Ears large; tail rather shorter than the head and body taken together; tarsi slender, and moderately long; fur long and very soft; general tint of the upper parts of head and body grayish, washed with brownish yellow; on the sides of the body a palish yellow tint prevails; feet, chin, throat, and under parts of body pure white; tail rather sparingly clothed with hairs, those on the apical portion rather long, and forming a slight pencil at the tip; on the upper side and at the tip of the tail the hairs are brown, on the under side they are dirty white; the ears are very sparingly clothed with minute brownish yellow hairs internally; externally, on the fore part, the hairs are rather longer and of a brown colour; the upper incisors are orange, and the lower incisors are yellow; the hairs of the moustaches are long, and of a black colour; the hairs of the back are deep gray at the base, brownish at the tip, and annulated with pale brownish yellow near the tip; the longer hairs are brown; the hairs of the belly are white externally, and gray at the base; on the throat the hairs are white to the root.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	8	Length of tarsus (claws included)	1	2½
of tail	5	6	of ear	0	8
from nose to ear	1	4½			

Habitat, Northern Patagonia (*August.*)

The molars of the upper jaw are figured in Plate 34, fig. 15, *a*, and those of the lower jaw, fig. 15, *b*.

"Inhabits the dry gravelly plain, bordering the Rio Negro."—D.

## 24. MUS XANTHOPYGUS.

## PLATE XXII.

*Mus xanthopygus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 28.

*M. supra pallidè brunneus flavo-lavatus, ad latera flavescens, subtus albus; capite griscescente; natibus flavis; pedibus albis; auribus majusculis pilis, albis et flavis intermixtis obsitis; caudà quoad longitudinem, corpus ferè æquante, supra nigricante, subtus albà; vellere longo et molli; mystacibus perlongis albescentibus, ad basin nigris.*

DESCRIPTION.—Ears rather large, tail rather longer than the body, tarsi moderately long and somewhat slender: fur long and very soft: prevailing tint pale yellow; on the back there is a brownish hue owing to the long hairs, which are thickly interspersed with ordinary fur, being of that colour: in the region of the tail the hairs are of a rich yellow colour; the tip of the muzzle is white, the feet, chin, throat and the whole under parts of the body are white; on the chest and belly a faint yellowish hue is observable: the tail is well clothed with tolerably long hairs, those on the apical portion are the longer, on the upper side of the tail they are of a brown colour, and on the under side they are pure white: the ears are well clothed with tolerably long hairs, those on the inner side are of a pale yellowish colour, externally on the fore part they are brown, and on the hinder part they are yellowish white: the hairs of the moustaches are numerous and very long; some of them are white, but the greater portion are brownish black at the base and whitish at the apex: the upper incisors are yellow, and the lower are yellow-white: the hairs of the ordinary fur on the back are gray at the base, brownish at the tip, and very pale yellow near the tip: the hairs on the belly are gray at the base and white externally.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	5	3	Length of tarsus (claws included)	1	1
of tail	3	10	of ear	0	7
from nose to ear	1	3			

There are three specimens of the present species in Mr. Darwin's collection; two of them were caught when shedding their fur, and having lost the longer black hairs, have the upper parts of the body of a paler colour; their general tint is very pale, and may be described as gray, with a wash of pale yellow.



This species is closely allied to the last, but differs in being rather smaller, in having smaller ears which are well clothed with hair, and not sparingly furnished as in *Mus griseo-flavus*, and in having a shorter tail which, like the ears, is more densely clothed with hairs; in the structure of the molar teeth there also differences which will be better understood by comparing the drawings. Fig. 16, *a*, Plate 34, represents the molars of the upper jaw, and 16, *b*, those of the lower jaw.

“Extremely abundant in the coarse grass and thickets in the ravines at Port Desire and Santa Cruz: was caught in a trap baited with cheese.”—D.

25. *MUS DARWINII*.

## PLATE XXIII.

*Mus Darwinii*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 28.

*M. supra pilis pallide cinnamomeis et nigrescentibus intermixtis; ante oculos cinerascen-*  
*tibus; genis, lateribus corporis, et caudâ prope basin, pallide cinnamomeis; partibus*  
*inferioribus pedibusque albis; auribus permagnis; caudâ caput corpusque ferè æquante,*  
*suprà fusco-nigricante, subtùs albâ.*

DESCRIPTION.—Form robust; ears immensely large; tail nearly equal in length to the head and body taken together; fore feet very small; tarsi moderate; fur very long and soft; general tint of the upper parts pale cinnamon yellow; on the rump a richer yellow hue prevails, and on the back there is a brownish tint, owing to the interspersed long hairs being of that colour; the upper surface of the head is grayish; the cheeks, like the sides of the body, are of a delicate yellow colour, faintly clouded with brown; the sides of the muzzle, lower part of the cheeks and sides of the body, and the whole under parts, are pure white; the feet and tail are also white, if we except the upper surface of the latter, which is dark brown; the yellow tint of the sides of the body is extended downwards on the outer side of the fore legs and on the back of the hinder legs; the ears are but sparingly furnished with hair, excepting on the fore part, externally, where they are of a brownish colour; the minute hairs which cover the remaining parts of the ear are very pale; the tail is well clothed with hairs; the hairs of the moustaches are numerous and very long; they are for the most part blackish at the base, and gray at the apex; the incisors are rather slender, the upper pair are an orange colour, and the lower, yellow; the hairs of the ordinary fur of the back are gray at

the base, broadly annulated with pale cinnamon yellow near the apex, and brownish at the apex; the hairs of the belly are deep-gray at the base, and white externally, those on the throat are pale gray at the base.

	In.	Lines.		In.	Lines.
Length from nose to root of tail . . . . .	6	0	Length of tarsus (claws included) . . . . .	1	1½
of tail . . . . .	4	9	of ear . . . . .	0	11¼
from nose to ear . . . . .	1	4½	Width of ear . . . . .	1	0¼*

Habitat, Coquimbo, Chile, (*May.*)

This species is evidently allied to the two preceding; and perhaps the “Rat quatrieme, ou Rat oreillard” of Azara, (*Mus auritus*, Desm.) will form one of this little group. The molar teeth of the upper jaw are figured in Plate 34, fig. 17, *a*—those of the lower jaw, fig. 17, *b*.

“Inhabits dry stony places.”—D.

26. *MUS GALAPAGOENSIS*.

## PLATE XXIV.

*M. supra fuscus, flavo-lavatus, ad latera flavescens, subtùs albus: pedibus pilis sordide*  
*albis tectis: auribus mediocribus; caudâ, quoad longitudinem, caput corpusque ferè*  
*æquante: vellere longo.*

DESCRIPTION.—Ears moderate, slightly pointed; tarsi moderate; tail slender, nearly as long as the head and body; fur long, and not very soft; upper parts of the body of a brownish hue, a tint produced by the admixture of black and palish yellow hairs; on the sides of the body the longer black hairs are less abundant, and the prevailing colour is yellow; under parts of the body white, with a very faint yellow tint; feet furnished above with dirty white hairs; ears rather sparingly clothed with hairs, those on the inner side of a yellow colour, and those on the outer side dusky; tail above brown, and beneath whitish; the hairs of the moustaches black; the incisors deep yellow; the hairs on the back are deep gray at the base, broadly annulated with palish yellow near the apex, and blackish at the apex; the longer hairs black; on the belly the hairs are gray at the base, and broadly tipped with yellowish white.

\* It is not easy to measure the *width* of the ears in these animals: upon measuring with a thread over the curve of the outer side I have found the width of the ears of the present animal to be as above given,—the dimension slightly exceeding that stated in the Proceedings of the Zool. Soc.



	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	0	Length of tarsus (claws included)	1	2
of tail	4	9	of ear	0	7
from nose to ear	1	3½			

Habitat, Chatham Island, Galapagos Archipelago, Pacific Ocean, (October.)

This species is less than *Mus Rattus*. The upper parts of the body have a slightly variegated appearance.

The skull of *Mus Galapagoensis* (Plate 33, fig. 8, a,) is rather smaller than that of *M. Rattus*, the nasal portion is proportionately longer, the cranial shorter, and the interparietal bone is smaller, especially in antero-posterior extent; its length is 15 lines, and its breadth is 8½ lines. The lower jaw is figured in Plate 34, fig. 14, a. Fig. 8, b, of Plate 33, represents the molars of the upper jaw, and fig. 8, c, those of the lower jaw.

"This mouse or rat is abundant in Chatham Island, one of the Galapagos Archipelago. I could not find it on any other island of the group. It frequents the bushes, which sparingly cover the rugged streams of basaltic lava, near the coast, where there is no fresh water, and where the land is extremely sterile."—D.

#### 27. MUS FUSCIPES.

PLATE XXV.

*M. supra fusco-nigrescens, subtus griseus; pedibus fuscis; auribus mediocribus, caudâ, quoad longitudinem, caput corpusque ferè æquante: vellere longissimo, molli.*

DESCRIPTION.—Form stout; ears moderate; tail equal to the body in length; tarsi moderate; fur very long. General tint of the upper part and sides of the head and body blackish brown with an admixture of gray; of the under parts grayish white; feet brown, the hairs grayish at the tip: tail black and but sparingly clothed with short bristly hairs: ears rather sparingly clothed with hairs, which are for the most part of a brownish gray colour. The ordinary fur of the back is about ¾ of an inch in length and very soft—of a deep gray colour, broadly annulated with brownish yellow near the tip and blackish at the tip: the longer hairs which are black, measure upwards of 1¼ inches in length. The upper incisors are of an orange colour and the lower are black.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	6	Length of ear	0	6½
of tail	4	3	of tarsus (claws included)	1	1
from nose to ear	1	6			

Habitat, Australia, King George's Sound, (March.)

Mammalia not belonging to the order *Marsupiatæ* are rare in the Continent of Australia. Besides the Dog, we are acquainted with none excepting a few species of Rodents, and these all belong to the family *Muridæ*.

The present animal adds one to the limited number already known: in the Museum of the Zoological Society there is another species, the characters of which I will point out in the next description.

*Mus fuscipes* is remarkable for the great length and softness of its fur, and the brown colour of its feet: it is rather less than *Mus Rattus*, and of a stouter form. Not having had an opportunity of examining the molar teeth and the cranium of this animal, I cannot be positive that it is a species of the genus *Mus*; in external characters and the form of the incisor teeth, however, it agrees perfectly with the animals of that genus.

"This animal was caught in a trap baited with cheese, amongst the bushes at King George's Sound."—D.

#### 28. MUS GOULDII.

*M. vellere longo, molli, ochraceo, pilis nigricantibus adperso, his ad latera rarioribus: corpore subtus, pedibusque albis: auribus majusculis: caudâ, capite corporeque paulo brevior.*

DESCRIPTION.—Ears rather large and slightly pointed, tarsi slender and tolerably long; tail about equal in length to the body and half the head; fur long and soft; general colour pale ochreous yellow; on the back there are numerous long black hairs interspersed with the ordinary fur, which gives a darker hue and somewhat variegated appearance to that part; feet, chin, throat, and the whole under-parts of the body white; ears brown, sparingly clothed with minute yellow hairs, both externally (excepting on the forepart, where they are brownish) and internally; tail brownish above, and yellowish white beneath; the hairs of the moustaches long, and of a brown colour; upper incisors deep orange, lower incisors yellow; claws white. The hair of the back is of a deep lead colour at the base, pale ochre near the apex, and dusky at the apex; the longer hairs are black; the hairs of the belly are deep gray at the base and broadly tipped with white.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	4	8	Length of tarsus (claws included)	1	0½
of tail	3	6	of ear	0	7
from nose to ear	1	0½			

VAR. β.—General colour of the fur pale ochreous yellow, the feet, under side of the tail and the whole of the under parts, as well as the lower portion of the



sides of the body, white; hairs of the back palish gray at the base, those of the belly indistinctly tinted with very pale gray at the roots; ears and moustaches pale brown.

Habitat, New South Wales.

This species is about half-way between *Mus Rattus* and *Mus musculus* in size, and is remarkable for its delicate colouring. The molar teeth are figured in Plate 34; fig. 18. *a*, represents the molars of the upper jaw, and fig. 18. *b*, those of the lower.

#### GENUS—REITHRODON.\*

*Dentes primores*  $\frac{3}{2}$ ; *inferioribus acutis, gracilibus, et anticè lævibus; superioribus gracilibus, anticè longitudinalitèr sulcatis.*

*Molares utrinque*  $\frac{3}{2}$  *radicati; primo maximo, ultimo minimo: primo superiore plicas vitreas duas externè et internè alternatim exhibente; secundo, et tertio, plicas duas externè, internè unam: primo inferiore plicas vitreas tres externè, duas internè; secundo, plicas duas externè, unam internè; tertio unam externè et internè, exhibitibus.*

*Artus inæquales: antipedes 4-dactyli, cum pollice exiguo: pedes postici 5-dactyli, digitis externis et internis brevissimis.*

*Ungues parvuli et debiles. Tarsi subtùs pilosi.*

*Cauda mediocris, pilis brevibus adpressis instructa.*

*Caput magnum, fronte convexo: oculis magnis: auribus mediocribus.*

The present genus according to my views belongs to the family *Muridæ*. The modifications of structure which have led me to separate it from the genus *Mus* are as follows:

*External characters.*—The most conspicuous points of distinction between the external characters of *Reithrodon* and *Mus* (if we regard *M. rattus*, *M. decumanus* or *M. musculus* as typical examples of that genus,) consist in the arched form of the head, the large size of the eyes, the stout form of the body, and the upper incisors being grooved. The ears, tail and feet are more densely

\* Ρειθρον, a channel; Οδον, a tooth.

clothed with hairs, and the tarsus is covered with hair beneath,—at least the hinder portion.

*Cranium.*—The skulls of the species of the present genus differ from those of the species of *Mus* in being proportionately shorter and broader, and more arched; the facial portion of the skull is larger, compared with the cranial, the space between the orbits is narrower, and the orbits are larger; the palate is narrower and the incisive foramina are more elongated and larger. The pterygoids approximate anteriorly, so that the posterior *nares* are greatly contracted. As in the genus *Mus* the anterior root of the zygomatic arch is directed upwards from the plane of the palate, and forwards in the form of a thin plate, protecting an opening behind, which leads into the nasal cavity, and also forming the outer boundary both of the ant-orbital foramen, and a second opening whose outlet is directed upwards. This thin plate, however, is narrower than is usually found in the genus *Mus*. The most striking differences observable in the lower jaw consist in the smaller size of the coronoid process, and its being curved outwards; the condyloid process is narrower, and the angle of the jaw, or descending ramus, approaches more nearly to a quadrate form—the posterior edge of the jaw is more deeply emarginated.

*Dentition.*—The incisors are narrow and compressed as in the genus *Mus*, but they are less deep from front to back; those of the upper jaw (Plate 33. fig 2. *b*.) have each a distinct longitudinal groove, which is situated nearer to the outer than to the inner edge of the tooth. Close to the inner edge of each of these teeth an indistinct second longitudinal groove may be seen by means of a lens. The lower incisors are nearly equal in width to the upper.

The crowns of the molar teeth in the young *Reithrodon* are higher than in *Mus*, and they are rootless; in the adult animal, however, they possess distinct roots. The folds of enamel form sigmoid flexures, are closely approximated to each other, and those of the opposite sides of the tooth meet.

#### 1. REITHRODON CUNICULOÏDES.

##### PLATE XXVI

*Reithrodon cuniculoïdes*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 30.

*R. suprà griseus, flavo-lavatus, pilis nigris intermixtis; abdomine gulâque pallidè flavis; natibus albis; pedibus albis; auribus mediocribus, intùs pilis flavis, extùs pilis pallidè flavis, obsitis; pone aures, notâ magnâ albescenti-flavâ; caudâ corpore breviorè, suprà pallidè fuscâ, subtùs albâ.*

*DESCRIPTION.*—Head rather large and arched; ears moderate; tail nearly as long



as the body; tarsi rather long; fur long and very soft. General tint of the upper parts of the body grayish brown, with a considerable admixture of yellow; of the sides of the body grayish tinted with yellow; the lower portion of the cheeks, and the lower half of the sides of the body are of a delicate yellow colour; the under parts of the head and body are yellowish white; the fore part of the thighs is whitish; the rump, feet, and tail are white, excepting the upper surface of the latter, which is brown; behind each ear there is a patch of yellowish white hairs. The ears are tolerably well-clothed with hairs; those on the inner side are for the most part of a yellow colour, but towards the posterior margin they are brown; externally, the hairs are also yellow, excepting on the fore part, where they are dusky brown. The hairs of the moustaches are very long and numerous; black at the base, and grayish at the apex. The feet are well clothed with hairs which cover and nearly hide the claws; the under side of the tarsus is clothed with grayish brown hairs. The tail is well clothed with tolerably long hairs which completely hide the scales. The hairs on the back are of a deep gray colour at the base, broadly annulated with yellow near the apex, and dusky at the apex: the longer hairs are black: on the throat and belly the hairs are deep gray at the base, and broadly tipped with pale yellow—towards the cheeks and sides of the body with a deeper yellow. The incisors are yellow.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	5	Length of tarsus (claws included)	1	4 $\frac{1}{4}$
of tail	3	3 $\frac{1}{2}$	of ear	0	7
from nose to ear	1	4			

Habitat, Patagonia, (*April and January*).

In the arched form of the head this little animal bears considerable resemblance to a young rabbit, a resemblance which has struck almost all who have seen it, I have therefore applied to it the specific name *Cuniculoides*. The skull is figured in Plate 33, fig. 2. *a.*, its dimensions are as follows:—

	In.	Lines.
Total length	1	4
Width	0	10
Length of nasal bones	0	7
of incisive foramina	0	4 $\frac{3}{4}$
Distance between the outer surface of the incisors and the front molar upper jaw	0	5
Longitudinal extent of the three molars of the upper jaw	0	3 $\frac{3}{4}$
Length of a ramus of the lower jaw, without the incisor	0	9 $\frac{3}{4}$

The molar teeth of the upper jaw are figured in Plate 33, fig. 2. *c.* and

2. *c.* of the lower jaw, fig. 2. *d.* Fig. 2. *b.* represents the incisors of the upper jaw magnified. Fig. 21. *a.*, Plate 34, represents the skull, viewed from beneath, fig. 21. *b.* is the side view of the same, and fig. 21. *c.* is the lower jaw.

"Specimens were procured at Port Desire, St. Julian, and Santa Cruz; at this latter place they were caught in numbers, (in traps baited with cheese,) both near the coast and on the interior plains. A specimen from Santa Cruz weighed 1336 grains. In the early part of January, there were young individuals at Port St. Julian."—D.

## 2. REITHRODON TYPICUS.

*Reithrodon typicus*, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 30.

*R. vellere supra pilis flavescenti-fuscis et nigrescentibus intermixtis composito; regione circa oculos, genis, lateribusque corporis auratis, pilis pallide fuscis intermixtis; partibus inferioribus auratis; rhinario ad latera flavescenti-albo; auribus magnis, intus pilis flavis, extus flavis et fuscis, indutis; caudâ supra pallide fuscâ, subtus sordide albâ; pedibus albis.*

DESCRIPTION.—Ears large; tarsi moderate; fur moderately long; general tint of the upper parts brown—of the upper surface of the head blackish; on the cheeks and flanks a rich yellow tint prevails; the under parts of the head and body are bright yellow; the feet are white; the tail is brownish above and dirty white beneath. The ears are tolerably well clothed with hairs, and these are of a yellowish colour, excepting on the fore part, externally, where they are brown; the tarsi are covered beneath with grayish brown hairs; the hairs of the moustaches are numerous and moderately long, black at the base and grayish at the apex. The hairs of the back are deep gray at the base, broadly annulated with yellow near the apex, and black at the apex; on the upper surface of the head the hairs are very narrowly annulated with yellow, hence a blackish hue prevails. The longer hairs on the back are black; the hairs of the throat and belly are gray at the base, and broadly tipped with yellow. The incisors are yellow.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	6	0	Length of tarsus (claws included)	1	2 $\frac{1}{2}$
of tail	?	*	of ear	0	8 $\frac{1}{2}$
from nose to ear	1	4 $\frac{1}{2}$			

Habitat, Maldonado, La Plata, (*June*).

\* The tail is imperfect.



This species is of a darker colour than the last, its ears are much larger and the tarsi are shorter. It has the same rabbit-like appearance. The molar teeth of the lower jaw are figured in Plate 33, fig. 4, *a*.

"This mouse, when alive, from its very large eyes and ears, had a singular appearance, somewhat resembling that of a little rabbit. It frequents small thickets in the open grassy savannahs near Maldonado, and was caught with facility by means of traps baited with cheese."—D.

### 3. REITHRODON CHINCHILLOIDES.

#### PLATE XXVII.

*R. vellere longissimo et mollissimo; corpore supra et ad latera cinereo, flavescenti-fusco lavato, subtus flavescenti-albo; caudâ corpore brevior, supra fuscâ, subtus albâ; auribus parvulis: tarsis mediocribus.*

DESCRIPTION.—Ears small; tail shorter than the body; tarsus moderate; fur long and extremely soft. General hue of the upper parts of the head and body ashy-brown; the lower part of the cheeks and sides of the body are of a delicate yellow colour; the under parts of the head and body and the rump are cream colour. The ears are blackish;\* the tail is tolerably well clothed with longish hairs, which are, however, not so thickly set as to hide the scales—on the upper side they are blackish brown; on the sides and beneath they are white. The feet are white. All the fur is of a deep gray colour at the base; the hairs of the back are of a very pale yellow colour (almost white) near the tip, and brown at the tip; the longer hairs are black at the apex. The incisors are yellow; the hairs of the moustaches are numerous and very long—some of them are whitish, and others are black at the root, and gray at the apex.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	5	0	Length of tarsus (claws included)	1	0
of tail	2	4	of ear	0	5½
from nose to ear	1	2			

Habitat, South shore of the Strait of Magellan, near the Eastern entrance.

This little animal was preserved in spirit, and has since been mounted, it is

\* They are naked, but I suspect the hair has been rubbed off.

probable, therefore, that the colours have been slightly changed. It is of a smaller size than either of the preceding species. Its fur is long, extremely soft, and somewhat resembles that of the Chinchilla. The ears are smaller, and the tail is shorter, and less densely clothed with hairs than in *Reithrodon cuniculoides*. The skull (see Plate 43, fig. 20, *a*, 20, *b*, and 20, *c*.) differs in many respects from that of the species last mentioned. It is of a smaller size, the nasal portion is proportionately shorter and narrower, the incisive foramina are shorter; the pterygoid processes do not approximate so nearly at their base, and the pterygoid fossæ are very shallow, whereas in *R. cuniculoides* they are deep. In the skull of the animal just mentioned there are two distinct longitudinal grooves on the palate, which extend backwards from the incisive foramina, and terminate in two rather large and deep excavations: these excavations are in the palatine bone, and situated between the last molar teeth; they are separated from each other by a narrow, longitudinal, elevated ridge; a narrow ridge also separates them from the pterygoid fossæ. At the bottom of each of these hollows are several minute foramina, and in front of them there are two larger longitudinal foramina. In *R. chinchilloides*, the longitudinal grooves on the palate and the posterior hollows are shallow, and consequently much less distinct; the pterygoid fossæ are very nearly on the same plane as the palate, and are indicated only by a very slight depression. The incisor teeth are broader than in *R. chinchilloides*, and the molar teeth are proportionately smaller. The thin plate which forms the anterior root of the zygomatic arch is deeply emarginated in front in *R. cuniculoides* (see Plate 34, fig. 21, *b*.); but in *R. chinchilloides*, the anterior margin of this plate is nearly straight, (see Plate 34, fig. 20, *c*.)

In the form of the lower jaw of the two animals under consideration there are differences which will be more clearly understood upon comparing the figures. I will therefore merely notice one remarkable character which is found in *R. cuniculoides*, and that is, that the condyloid process is rather deeply concave on the inner side, a character which does not exist in *R. chinchilloides*, nor do I recollect having observed it in any other Rodent.

The principal dimensions of the skull of *R. chinchilloides*, are as follows:—

	In.	Lines.
Total length	1	2
Width	0	8½
Length of nasal bones	0	6½
of incisive foramina	0	4
Distance between the outer surface of the incisors and the first molar tooth, upper jaw	0	4½
Longitudinal extent of the three molars of the upper jaw, taken together	0	2¾
Length of a ramus of the lower jaw without the incisor	0	8



*General Observations upon the foregoing Species of Muridæ.*

In the foregoing descriptions I have endeavoured to convey an idea of the characters of the species of mice submitted to me for examination and description, by Mr. Darwin: there are, however, some points upon which I have been silent in my descriptions. I allude to the characters observable in the dentition. I have omitted to notice the various modifications in the structure of the molar teeth, because I found it would lengthen the descriptions to no good purpose, inasmuch as of almost all the species I have made outlines of the molars, which will convey a more clear idea than any verbal description can do.

Upon an inspection of the Plates, it will be seen, that by far the greater portion of the teeth figured, may be referred to one particular type of form or pattern, and that this pattern does not agree with that observed in the molars of *Mus Rattus*, *M. decumanus*, or *M. musculus*, whilst these three species agree essentially with each other.

In the young Black Rat (*Mus Rattus*), before the teeth are worn, the two anterior molar teeth, on either side of the upper jaw, present three longitudinal rows of tubercles, a central series of larger tubercles, and on each side of these, a row of smaller ones. The front molar has three of the larger tubercles arranged along the middle of the tooth; three smaller ones on the outer side, and two, on the inner side. The second molars have two central tubercles, two outer, and two inner ones. The posterior molar is nearly round, the body of the tooth consists of three principal tubercles, and one small tubercle, situated on the inner and anterior portion of the tooth.

The corresponding teeth in the young of *Mus bimaculatus* present a very different appearance; the molars, instead of having three longitudinal rows of tubercles, have only two. An idea of the appearance of these teeth may be formed by removing the inner row of tubercles from the molars of *Mus rattus*. We should then have, as in *Mus bimaculatus*, molars of a narrower form, the first tooth presenting six tubercles, the second, four; and the posterior tooth devoid of the small inner lobe; the opposing tubercles of each tooth, however, in *M. bimaculatus*, are of equal size.

The molars of the lower jaw of *Mus bimaculatus* agree with those of *M. Rattus* as to the number of tubercles which they possess; they are, however, proportionately longer and narrower, and, when a little worn, these teeth, as well as those of the upper jaw, differ considerably from those of *M. Rattus*. In the last named animal, when the molars are slightly worn, the ridges of enamel run completely across the tooth, as in Figs. 18 and 19, Plate 34. Such is not the case

in *M. bimaculatus* at any age. As soon as the molar teeth are worn, the folds of enamel penetrate the body of the tooth on each side, and those of one side alternate with those of the other,—in fact, they very nearly resemble those of the *Hamsters* (*Cricetus*).

I have selected the molar teeth of *Mus Rattus* and *M. bimaculatus* for comparison, since I happened to possess specimens displaying both the young and adult states of each. But had I selected, on the one hand, almost any of the species brought from South America by Mr. Darwin, and, on the other hand, the *Mus musculus* or *M. decumanus*, I should have had to point out the same distinctions—the former agreeing in dentition with *M. bimaculatus*, and the latter with *M. Rattus*.

The differences pointed out, between the molar teeth of *Mus Rattus* and those of *M. bimaculatus*, I cannot but consider as important, since all the Old World species of *Mus* which I have yet had an opportunity of examining (and they are numerous) agree essentially with the former, whilst the only *Mus* from S. America (excepting *M. Musculus* and *M. decumanus*, which are carried in ships to all parts of the world) in which I have as yet found molar teeth like those of *M. Rattus*, is the *Mus Maurus*, and this it has been stated is possibly a variety of *M. decumanus*.

Although as yet I have not met with species in the Old World possessing the characters of the South American *Muridæ*, among those of North America, several have come under my observation. The *Mus leucopus*, *Symidon hispidum*, and the species of *Neotoma* certainly belong to the same group,\* as does also the species of the Galapago Islands, described in this work under the name *Galapagoensis*.

These considerations have induced me to separate the South American mice from those of the Old World,—or rather from that group of which *M. decumanus* may be regarded as the type,—and to place them, together with such North American species as agree with them in dentition, in a new genus bearing the name *Hesperomys*.†

Whether this group be confined to the Western hemisphere or not, I will not venture to say, but I think I may safely affirm that that portion of the globe is their chief metropolis.

The species of the genus *Hesperomys*, which depart most from the type—whose dentition is least like figs. 5, *a*, and 5, *b*, Plate 33. or 6, *a*, and 6, *b*, of the

\* I am acquainted with seven North American Species of *Muridæ*, all of which possess the dentition of *Hesperomys*.

† *Ἑσπερος*, West, and *Mus*.



same Plate—recede still farther from the genus *Mus*, and approach more nearly (as regards the dentition) to the *Arvicolidae*. Among the species here described I may mention as examples, *M. griseo-flavus*, *M. zanthopygus*, and *M. Darwinii*;—see the molar teeth figured in Plate 34. figs. 15, 16, and 17,—and among the North American species, those constituting the genus *Neotoma*. The latter make by far the nearest approach to the *Arvicolidae* of any which have yet come under my observation, not only in the dentition, but in the form of the skull and the large size of the coronoid process of the lower jaw; there is, nevertheless, a tolerably well marked line of distinction between the crania of the *Arvicolidae* and *Neotoma*.

The skulls of the animals belonging to the genera *Castor*, *Ondatra*, *Arvicola*, *Spalax*, and *Geomys*, which constitute the principal groups of the family *Arvicolidae*, when compared with those of the family *Muridae*, present, among others, the following distinctive characters.

The temporal *fossæ* are always much contracted posteriorly, by the great anterior and lateral development of the temporal bones; the plane of the intermolar portion of the palate is below the level of the anterior portion; the coronoid process of the lower jaw is very large, the articular portion of the condyloid process is proportionately broad; the descending ramus, or posterior coronoid process, is so situated that its upper portion terminates considerably above the level of the crowns of the molars; this same process is generally \* directed outwards from the plane of the horizontal ramus. The incisor teeth of the *Arvicolidae* differ from those of the *Muridae* in being proportionately broader and less deep from front to back—they are not laterally compressed as in *Mus*. The molar teeth are rootless,† and the folds of enamel are the same throughout the whole length of the tooth; whereas in *Mus* they enter less and less deeply into the body of the tooth as we recede from the crown, and towards the base of the visible portion (the tooth being in its socket) the indentations of the enamel are obliterated.

Now in the species of *Hesperomys*, the molar teeth are always rooted, and in the form of the skull and the lower jaw they agree with the *Muridae*, and do not

\* I am acquainted with only one exception, and that is in the genus *Castor*. In the genus *Ondatra*, the descending ramus is but slightly twisted outwards, but in all the other *Arvicolidae*, whose crania I have examined, it is remarkably so, and in the genera *Spalax* and *Geomys*, where this character is carried to the extreme, the descending ramus projects from the alveolus of the long inferior incisors, in the form of a rounded and almost horizontal plate.

† In aged individuals of some of the species of *Arvicolidae*, the molar teeth possess short roots. In a skull of *Ondatra* now before me I find all the molars divided at the base into two portions, which in all probability would have formed solid roots had the animal lived longer.

present the characters above pointed out as distinguishing the *Arvicolidae*, and as regards the cranium and lower jaw, it is only in the genus *Neotoma* that any approach is evinced.

Of the various groups of the order *Rodentia* found in South America, the *Sciuridae*, so far as I am aware, are chiefly confined to the more northern parts, and do not occur in the most southern; the *Myoxidae*, *Gerboideæ*, and *Arvicolidae* are wanting. The species of the family *Muridae* belong to different sections to those of the Old World. Of the *Leporidae* I am acquainted only with one well established species—the *Lepus Braziliensis*, which however is not found “in tota America Australi,” as Fischer says, there being no Hare yet found in the more southern parts, where the *Cavies* and *Chinchillas* appear to take their place. The remaining South American Rodents—certain species of *Hystricidae*, the genera, *Echimy*s, *Dasyprocta*, *Cælogeny*s and *Myopotamus*, together with the *Octodontidae* and *Chinchillidae*, all possess a peculiar form of skull and of the lower jaw, (more or less approaching to figs. 1, Plate 33, and figs. 23, Plate 34.) which I have described in the “Magazine of Natural History,” for February 1839, and which is rarely found in the North American, or Old World Rodents. In enumerating the above groups, I omitted the *Caviidae*, because in the form of the lower jaw they differ somewhat from the rest—they possess, in fact, a form of lower-jaw peculiar to themselves; but in the *Chinchillas*\* the transitions between one form and the other are found.

The South American *Muridae*, which form the chief part of Mr. Darwin's collection, were none of them procured further north than latitude 30°, with the exception of those from the Galapagos Archipelago. The species occur at the following localities.

## WEST COAST OF SOUTH AMERICA.

## GALAPAGOS ARCHIPELAGO.

*Mus* Jacobinæ.  
— Galapagoensis.

## COQUIMBO.

*Mus* longipilis.  
— Renggeri.  
— Darwinii.

## EAST COAST OF SOUTH AMERICA.

## MALDONADO.

*Mus decumanus*.  
— maurus.  
— *Musculus*.  
— tumidus.  
— nasutus.  
— obscurus.  
— arenicola.  
— bimaculatus.  
— flavescens.  
*Reithrodon typicus*.

\* See Proceedings of the Zoological Society for April 9th, 1839, p. 61.



## WEST COAST.

## VALPARAISO.

Mus Renggeri.

— *decumanus*.

## CONCEPCION.

Mus longicaudatus.

## CHILOE AND CHONOS ARCHIPELAGO.

Mus brachiotis.

## EAST COAST.

## BUENOS AYRES.

— Mus *decumanus*.

## BAHIA BLANCA.

Mus *Braziliensis*.— *elegans*.— *gracilipes*.

## RIO NEGRO.

Mus *griseo-flavus*.

## PORT DESIRE.

Mus *canescens*.

## ST. JULIAN.

Reithrodon *cuniculoides*.— *xanthopygus*.Reithrodon *cuniculoides*.

## SANTA CRUZ.

Mus *canescens*.— *micropus*.— *xanthopygus*.Reithrodon *cuniculoides*.

## FALKLAND ISLANDS.

Mus *decumanus*.— *Musculus*.

## STRAITS OF MAGELLAN.

Mus *xanthorhinus*.— *Magellanicus*.Reithrodon *chinchilloides*.

## SECTION—HYSTRICINA.

## FAMILY— ———?

## MYOPOTAMUS COYPUS.

Myopotamus Coypus, *Auct.*

“This animal, in Chile, is known by the name of ‘Coypu;’ at Buenos Ayres, where an extensive trade is carried on with their skins, they are improperly called ‘nutrias,’ or otters. In Paraguay, according to Azara, their Indian name is ‘guiya.’ On the east side of the continent they range from Lat. 24° (Azara)

to the Rio Chupat in 43° 20';—distance of 1160 miles. This latter river is 170 miles south of the Rio Negro, and the intervening space consists of level, extremely arid, and almost desert plains, with no water, or at most one or two small wells. As the Coypu is supposed never to leave the banks of the rivers, and being, from its web-feet and general form of body, badly adapted for travelling on land, its occurrence in this river is a case, like so many others in the geographical distribution of animals, of very difficult explanation. The same remark is indeed applicable, but with less force, to its existence in the Rio Negro. On the west coast, it is found from the valleys of central Chile (Lat. 33°) to 48° S., or perhaps even somewhat farther, but not in Tierra del Fuego. So that, on the Atlantic side of the continent, the plains of Patagonia check its range southward, as, on the Pacific side, the deserts of Chile do to the north. Its range, including both sides, is from 24° to 48°, or 1440 miles. In the Chonos Archipelago these animals, instead of inhabiting fresh water, live exclusively in the bays and channels which extend between the innumerable small islets of that group. They make their burrows within the forest, a little way above the rocky beaches. I believe it is far from being a common occurrence, that the same species of any animal should haunt indifferently fresh water, and that of the open sea. We shall see that the Capybara is sometimes found on the islands near the mouth of the Plata; but these cannot be considered as their habitual station in the same manner as the channels in the Chonos Archipelago are to the Coypu. The inhabitants of Chiloe, who sometimes visit this Archipelago for the purpose of fishing, state that these animals do not live solely on vegetable matter, as is the case with those inhabiting rivers, but that they sometimes eat shell-fish. The Coypu is said to be a bold animal, and to fight fiercely with the dogs employed in chasing it. Its flesh when cooked is white and good to eat. An old female procured (January) amongst these islands, weighed between ten and eleven pounds.” D.

## FAMILY—OCTODONTIDÆ.

## CTENOMYS BRAZILIENSIS.

Ctenomys *Braziliensis*, *De Blainville*, Bulletin de la Société Philomatique, June 1836, p. 62.

Maldonado, La Plata, (*June*.)

“This animal is known by the name of Tucutuco. I have given an account of its habits in my journal, but I shall here repeat it for the sake of keeping



together my observations on the less known animals. The Tucutuco is exceedingly abundant in the neighbourhood of Maldonado, but it is difficult to be procured, and still more difficult to be seen, when at liberty. Azara,\* who has given an account of its habits, with which every thing I saw perfectly agrees, states that he never was able to catch more than one, although they are so extremely common. The Tucutuco lives almost entirely under ground, and prefers a sandy soil with a gentle inclination; but it sometimes frequents damp places, even on the borders of lakes. The burrows are said not to be deep, but of great length. They are seldom open; the earth being thrown up at the mouth into hillocks not quite so large as those made by the mole. Considerable tracts of country are completely undermined by these animals. They appear, to a certain degree, to be gregarious; for the man who procured my specimens had caught six together, and he said this was a common occurrence. They are nocturnal in their habits; and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. In the stomach of one which I opened I could only distinguish, amidst a yellowish green soft mass, a few vegetable fibres. Azara states that they lay up magazines of food within their burrows.

"The Tucutuco is universally known by a very peculiar noise, which it makes when beneath the ground. A person, the first time he hears it, is much surprised; for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it. The noise consists in a short, but not rough, nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer, and more distinct than the three following: the musical time of the whole is constant, as often as it is uttered. The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the Tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind legs; and they are likewise quite incapable of jumping even the smallest vertical height. Mr. Reid, who dissected a specimen which I brought home in spirits, informs me that the socket of the thigh-bone is not attached by a ligamentum teres; and this explains, in a satisfactory manner, the awkward movements of their hinder extremities. Their teeth are of a bright wax yellow, and are never covered by the lips: they are not adapted to gnaw holes or cut wood. When eating any thing, for instance biscuit, they rested on their hind legs and held the piece in their fore paws; they appeared also to wish to drag it into some corner. They were very stupid in making any attempt to escape; when angry or frightened, they uttered

\* Azara's Voyages dans l'Amerique Meridionale, vol. i. p. 324.

the Tucutuco. Of those I kept alive, several, even the first day, were quite tame, not attempting to bite or to run away; others were a little wilder. The man who caught them asserted that very many are invariably found blind. A specimen which I preserved in spirits was in this state; Mr. Reid considers it to be the effect of inflammation in the nictitating membrane. When the animal was alive, I placed my finger within half an inch of its head, but not the slightest notice was taken of it: it made its way, however, about the room nearly as well as the others. Considering the subterranean habits of the Tucutuco, the blindness, though so frequent, cannot be a very serious evil; yet it appears strange that any animal should possess an organ constantly subject to injury. The mole, whose habits in nearly every respect, excepting in the kind of food, are so similar, has an extremely small and protected eye, which, although possessing a limited vision, at once seems adapted to its manner of life.

"Several species probably will be found to exist south of the Plata. At Bahia Blanca (Lat. 39°) an animal burrows under ground in the same manner as the *C. Braziliensis*, and its noise is of the same general character, but instead of being double and repeated twice at short intervals, it is single and is uttered either at equal intervals, or in an accelerating order. I was assured by the inhabitants that these animals are of various colours, and, therefore, I presume that the two kinds of noises proceeded from two species. However this may be, they are extraordinarily numerous: many square leagues of country between the Sierras Ventana and Guetru-heigue are so completely undermined by their burrows, that horses in passing over the plain, sink, almost every step, fetlock deep. At the Rio Negro (Lat. 41°) some closely allied (or same?) species utters a noise, which is repeated only twice, instead of three or four times as with the La Plata kind. The sound is, moreover, louder and more sonorous; and so closely resembles that made in cutting down a small tree with an axe, that I have occasionally remained in doubt for some time to which cause to attribute it. Where the plains of Patagonia are very gravelly (as at Port Desire and St. Julian) the *Ctenomys*, I believe, does not occur; but at Cape Negro, in the Strait of Magellan, where the soil is damper and more sandy, the whole plain is studded with the little hillocks, thrown up by this destructive animal. It occurs likewise south of the Strait, on the eastern side of Tierra del Fuego, where the land is level. Captain King brought home a specimen from the northern side of the Strait, which Mr. Bennett\* has called *C. Magellanicus*: it is of a different colour from the *C. Braziliensis*. I unfortunately did not make any note regarding the noise of this southern species: but the circumstance of its existence rather corroborates my belief in there being several other kinds in the neighbourhood of the Rio

\* Transactions of the Zoological Society, vol. ii. p. 84.



Negro and Bahia Blanca. Otherwise we must believe that the same animal utters different kinds of noises, in different districts; a fact which I should feel much inclined to doubt.

"Azara\* says that the Tucutuco may be 'found every where; provided that the soil be pure sand, and the situation not subject to be overflowed. As these conditions are fulfilled only in certain spots, their warrens are far separated from each other, even sometimes more than twenty-five leagues, without it being possible to conceive how these animals have been able to pass from one place to another.' The difficulty, I think, is much overstated; for, as I have said, the burrows of the Tucutuco are sometimes made in very damp places, near lakes; so that they certainly might pass over almost any kind of country. But if the *C. Braziliensis* and *C. Magellanicus* be considered as one species, as some French authors are inclined to do, then the difficulty will be increased in a very remarkable manner, as we shall be obliged to transport the Tucutuco over wide plains of shingle, and across many great rivers, and an arm of the sea."—D.

POEPHAGOMYS ATER.

Poephagomys ater, *F. Cuvier*, Annales des Sciences Naturelles, 2d series, Zoologie, tom. 1. p. 321. June, 1834.

Chile, (September.)

"This animal is generally scarce, but in certain districts, I believe, of an alpine character, it is abundant. It excavates very extensive superficial burrows, no doubt, for the purpose of feeding on the roots of plants, as in the case of the *Ctenomys Braziliensis*, the habits of which have just been described. Horses passing over districts frequented by these animals, sink fetlock deep through the turf. I procured my specimen from Valparaiso, where the country-people called it 'Cururo.'"—D.

OCTODON CUMINGII.

Octodon Cumingii, *Bennett*, Proc. of Committee of Science and Correspondence of the Zool. Soc. for 1832, p. 46.

Transactions of the Zoological Society of London, vol. ii. p. 81. Pl. 16.

Dendrobis Degus, *Meyen*. Acta Academiae, c. l. c. Naturæ Curiosorum, xvi. p. 610. Pl. 44, 1833.

Valparaiso, Chile, (October.)

\* Azara Voyage dans l'Amerique Meridionale, vol. i. p. 324.

These little animals are exceedingly numerous in the central parts of Chile. They frequent by hundreds the hedge-rows and thickets, where they make burrows close together, leading one into another. They feed by day in a fearless manner; and are very destructive to fields of young corn; when disturbed, they all run together towards their burrows in the same manner that rabbits in England do when feeding outside a covert. When running they carry their tails high up, more like squirrels than rats; and they often remain seated on their haunches, like the former animals. According to Molina\* they lay up a store of food for the winter, but do not become dormant. The Octodon is the "degu" of that author: he says that the Indians in past times used to eat them with much relish. These animals appear to be very subject to be piebald and albinos; as if partly under the influence of domestication.

GENUS—ABROCOMA.†

*Dentes primores*  $\frac{3}{2}$  *acuti, eradicati, anticè leves*: *molares utrinque*  $\frac{4}{4}$  *subæquales, illis maxillæ superioris in areas duas transversales ob plicas vitreas acutè indentatus divisus*; *plicis utriusque lateris via æquè profundis*; *illis mandibulæ inferioris in tres partes divisus, plicis vitreis his internè, semel externè indentatis, areâ primâ sagittæ cuspidem fingente, cæteris acutè triangularibus.*

*Artus subæquales.*

*Antipedes* 4-dactyli, *externo brevissimo, intermediis longissimis et ferè æqualibus.*

*Pedes postici* 5-dactyli; *digito interno brevissimo. Ungues breves et debiles, illo digiti secundi lato et lamellari; omnibus setis rigidis obtectis.*

*Caput mediocre, auribus magnis, membranaceis; oculis mediocribus.*

*Cauda breviuscula.*

*Vellus perlongum, et molle.*

The genus *Abrocoma* is evidently allied on the one hand to the genera *Octodon*, *Poephagomys*, and *Ctenomys*, and on the other to the family *Chinchillidæ*. The four genera just mentioned possess so many characters in common, that it would be well to unite them, and the name *Octodontidæ* may be used to designate the group.

The *Octodontidæ* appear to bear the same relations to *Echimy*s, as the *Arvicolæ* do to the *Muridæ*.

\* Compendio de la Hist. Nat. del Reyno de Chile, vol. i. p. 343.

† 'Αβρος, soft; Κομη, hair.



In the *Octodontidæ* the skull is rather short, the inter-orbital space is broad; the ant-orbital passage is large; the zygomatic arch is thrown out horizontally from the plane of the palate; the malar bone is broad and somewhat compressed, and throws up a small post-orbital process; the glenoid cavity of the temporal bone is narrow; the palate is contracted, and deeply notched posteriorly, the portion which lies between the molar teeth descends below the level of the anterior portion; the incisive foramina are wide: the body of the anterior and posterior sphenoids is very narrow, and the foramina on either side of them are large: the occipital condyles are very narrow, widely separated, and the articular surface is nearly vertical.\* The descending *ramus* of the lower jaw springs from the outer side of the alveolar portion, and terminates in a point, more or less acute.

The incisors of the upper and lower jaws are of the same width: the molars are  $\frac{4}{1}-\frac{4}{4}$ , rootless.

In external characters the species of the present group vary considerably. The toes are 5|5 or 4|5. The claws of the hind feet are covered by strong, curved bristly hairs.

The principal points of distinction in the external characters of the four genera under consideration, may be thus expressed.

† TOES 5|5.

A. Fore feet formed for burrowing—strong and armed with large claws; tail short.

- |   |                      |
|---|----------------------|
| a. Ears minute, incisors very broad . . . . . | <i>Ctenomys</i> .    |
| b. Ears small, incisors broad . . . . .       | <i>Poeplogomys</i> . |

B. Fore feet weak; claws small; incisors narrow; ears large.

- |  |                  |
|--|------------------|
| a. Tail with the apical portion furnished with long hair . . . . . | <i>Octodon</i> . |
|--|------------------|

†† TOES 4|5.

- |   |                   |
|---|-------------------|
| b. Tail furnished throughout with short adpressed hairs . . . . . | <i>Abrocoma</i> . |
|---|-------------------|

It is not only in the comparatively small size and weakness of the fore feet that *Abrocoma* approaches more nearly to *Octodon*; but it agrees in having the soles, both of the fore and hind feet (which are devoid of hair), covered with minute round fleshy tubercles (see the under side of the tarsus figured in Plate 28.)

In *Octodon*, however, the toes have on their under side transverse incisions, as the *Muridæ*, and many other Rodents; a character not found in *Abrocoma*.

\* There is a wide difference between the present animals and the *Arvicolidæ* in the form of the occipital condyles: the same difference is also observable between *Echimy*s and *Mus*. The *Octodontidæ* in fact have the same form of condyles as the Chinchillas and Cavies. In this and many other characters the last mentioned animals evince an affinity to the *Leporida*.

Here the under-side of the toes, like the sole of the foot, is covered with minute tubercles.

Though in the form of the skull *Abrocoma Cuvieri*\* agrees most nearly with that of *Octodon*; it differs in having the anterior portion narrower and rather larger, compared to the part devoted to the protection of the brain; the zygomatic arch is shorter, the incisive foramina are longer, the body of the anterior sphenoid is narrower, and the auditory bullæ are larger. The principal differences observable in the form of the lower jaw of *Abrocoma*, when compared with that of *Octodon*, consists in the coronoid process being smaller, the condyloid narrower from front to back; the descending *ramus* more deeply emarginated posteriorly, and the angle longer and more attenuated.

In those characters in which the skull of *Abrocoma* departs from that of *Octodon*, it approaches nearer to *Chinchilla*. In the peculiar form and large size of the ears, in the extreme softness of the fur, in the greater development of the pads on the under side of the toes, and in the possession of only four toes to the fore feet, there are other points of resemblance between *Abrocoma* and *Chinchilla*. In the Chinchilla as well as in *Octodon* and *Abrocoma*, we find the toe corresponding to the second (counting from the inner side) furnished with a broad hollow nail;† there are also stiff bristly hairs covering this nail as in the *Octodontidæ*.

The extreme softness of the fur of the animals about to be described, suggested for them the generic name of *Abrocoma*. The fur consists of hairs of two lengths, and the longer hairs are so extremely slender that they might almost be compared to the web of the spider. The specific names applied are those of the distinguished naturalists who first made us acquainted with the two genera, *Octodon* and *Poeplogomys*.

1. ABROCOMA BENNETTII.

PLATE XVIII.

*Abrocoma Bennettii*, *Waterh.*, Proceedings of the Zoological Society of London, for February 1837, p. 31.

*A. corpore supra griseo, ad latera pallidiore et pallidè cervino lavato, subtus albescenti-cervino; gula albescenti-grisea; pedibus sordidè albis: auribus amplis, ad marginem posticum rectis, extus ad bases vellere, sicut in corpore, obsitis: caudâ corpore brevior, ad basin crassiusculâ, pilis brevibus incumbentibus vestitâ.*

DESCRIPTION.—Form stout; ears large, with the posterior margin straight; fore

\* I have not had an opportunity of examining the skull of *Abrocoma Bennettii*.

† This nail no doubt is used to cleanse the fur, and the bristly hairs may also assist in the operation; the two small toes of the Kangaroo's hind foot are used for the same purpose.



feet rather small, tarsus short; tail rather shorter than the body, thick at the base; fur long and extremely soft, and silk-like. General colour pale grayish brown, with a slight yellow wash; the upper part of the head and the back dusky brown; under parts of the body very pale yellowish brown, inclining to white; chin and throat whitish; feet dirty white; tail well clothed with hairs, which are closely adpressed, brown above, and of a very pale brown beneath at the base, darker towards the apex. The hairs of the moustaches are numerous, long, rather slender, and of a brownish colour. The ears are brown, furnished externally at the base with fur resembling that of the body; the remaining parts (both external and internal) are beset with long and extremely slender brown hairs, which project considerably beyond the margin of the ear. The ordinary fur on the back is about ten lines in length, but thickly interspersed with this fur, are longer hairs which are so delicate that they may almost be compared to the spiders' thread. Both on the upper and under side of the body the fur is deep gray at the base. The incisors are yellow.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	9	9	Length of tarsus (claws included)	1	4
of tail	5	0	of ear	0	10
from nose to ear	1	11	Width of ear	1	0½

Habitat, Chile, (August.)

"This animal was caught amongst some thickets in a valley on the flanks of the Cordillera, near Aconcagua. On the elevated plain, near the town of Santa Rosa, in front of the same part of the Andes, I saw two others, which were crawling up an acacia tree, with so much facility, that this practice must be, I should think, habitual with them."—D.

## 2. ABROCOMA CUVIERI.

### PLATE XXIX.

Abrocoma Cuvieri, *Waterh.*, Proceedings of the Zoological Society of London for February 1837, p. 32.

*Ab. supra grisea, levitèr ochraceo lavata; abdomine gulâque albescenti-griseis; pedibus sordidè albis; auribus amplis, ad marginem posticum distinctè emarginatis; caudâ corpore multò breviorè, et nigrescente.*

DESCRIPTION.—Ears large; tail considerably shorter than the body; fur extremely

soft; general colour gray faintly washed with yellow; under parts of the body grayish white; feet dirty white; tail dusky, paler beneath at the base: the ears are large, distinctly emarginated behind, and appear to be almost naked, but, upon close examination, long and extremely fine hairs may be observed. All the fur is gray at the base; the hairs of the moustaches are numerous and very long, those nearest the mouth are white, the others are black at the base and grayish beyond. The incisors are of a palish yellow colour.

	In.	Lines.		In.	Lines.
Length from nose to the root of tail	6	6	Length of tarsi (claws included)	1	1
of tail	2	10	of ear	0	7
from nose to ear	1	4	Width of ear	0	7½

Habitat, Chile, (September.)

This species is about one-third the size of the last, it differs moreover in being gray instead of brown, and in having the posterior margin of the ear emarginated; the tail is also rather shorter in proportion.

The skull\* is figured in Plate 33, fig. 1, *a*, and 1, *b*; and fig. 23, *a*, Plate 34. Its length is 1 inch, 4½ lines; width 9¼ lines; length of nasal bones 6 lines; distance between fore part of incisors and the front molar (upper jaw) 5 lines; longitudinal extent of the three molars of upper jaw 3 lines; length of auditory bullæ 5½ lines; length of *ramus* of lower jaw (see Plate 33, fig. 1, *c*), without incisors, 11½ lines. Fig. 23, *c*, Plate 34, represents the inner side of a *ramus* of the lower jaw: fig. 1, *d*, Plate 33, is the lower jaw seen from above: fig. 23, *b*, Plate 34, is the same seen from beneath. This view is given to show the position of the descending ramus of the lower jaw—that it springs from the outer side of the alveolar portion, as in a great portion of the South American Rodents, such as *Dasyprocta*, *Myopotamus*, *Echimy*s, *Chinchilla*, and also in that genus found in the West Indian islands, *Capromys*. Fig. 1, *e*, Plate 33, represents the molar teeth of the upper jaw, and fig. 1, *f*, those of the lower.

"This species is abundant on the dry hills, partly covered with bushes, near Valparaiso."—D.

\* The skull is, unfortunately, imperfect, the hinder portion is injured, and the arches which enclosed the ant-orbital openings are broken.



## FAMILY—CHINCHILLIDÆ.

## LAGOSTOMUS TRICHODACTYLUS.

Lagostomus trichodactylus, *Brooks*, Transactions of the Linnean Society, vol. xvi. p. 95, Pl. 9.  
 La Vizcache, *Azara*, Essais sur l'Histoire Naturelle des Quadrupèdes de la Province du Paraguay,  
 vol. ii. p. 41. Trad. Franc.  
 Vischacha, *Meyen*, Acta Academiæ, c. l. c. Naturæ Curiosorum, Tom. xvi. pars 2, p. 584.

Habitat, La Plata.

"I will not repeat what I have said about the habits of this animal in my Journal, as it is merely a corroboration of Azara's account. According to that author, the Bizcacha is not found north of 30°; and its southern limit occurs in the neighbourhood of the Rio Negro in 41°. Where the plains are gravelly, it is not abundant, but (differently from the *Cavia Patagonica*,) it prefers an argillaceous and sandy formation, such as that near Buenos Ayres. The Bizcacha abounds over the whole Pampas, even to the neighbourhood of Mendoza, and there it is replaced in the Cordillera by an Alpine species. Of the latter animal, I saw one seated on a pinnacle at a great height, but I could not obtain a specimen of it. Azara\* has remarked that the Bizcacha, fortunately for the inhabitants of Banda Oriental, is not found to the eastward of the Rio Uruguay; and what makes the case more remarkable is, that although thus bounded by one river, it has crossed the broader barrier of the Parana, and is numerous in the province of Entre Rios. I was assured by a man, whose veracity I can perfectly trust, that these animals, quasi canes, post coitum adnexi sunt."—D.

## FAMILY—CAVIIDÆ.

## KERODON KINGII.

Kerodon Kingii, *Bennett*, Proceedings of the Zoological Society of London for 1835, p. 190.

Habitat, Patagonia.

"The Kerodon is common at intervals along the coast of Patagonia, from the

\* Azara 'Voyages dans l'Amerique Meridionale,' vol. i. p. 316.

Rio Negro (Lat. 41°) to the Strait of Magellan. It is very tame, and commonly feeds by day: it is said to bring forth two young ones at a birth. At the Rio Negro it frequents in great numbers the bottoms of old hedges: at Port Desire it lives beneath the ruins of the old Spanish buildings. One old male killed there weighed 3530 grains. At the Strait of Magellan, I have seen amongst the Patagonian Indians, cloaks for small children made with the skins of this little animal; and the Jesuit Falkner says, that the people of one of the southern tribes, take their name from the number of these animals which inhabit their country. The Spaniards and half-civilized Indians, call the Kerodon, 'conejos,' or rabbit; and thus the mistake has arisen, that rabbits are found in the neighbourhood of the Strait of Magellan."—D.

## 1. CAVIA COBAIA.

*Cavia Cobaia*, *Auct.*

Habitat, Maldonado, La Plata, (*June*.)

"This animal, known by the name of Aperea, is exceedingly common in the neighbourhood of the several towns which stand on the banks of the Rio Plata. It frequents different kinds of stations,—such as hedge-rows made of the Agave and Opuntia, or sand-hillocks, or again, marshy places covered with aquatic plants;—the latter appearing to be its favourite haunt. Where the soil is dry, it makes a burrow; but where otherwise, it lives concealed amidst the herbage. These animals generally come out to feed in the evening, and are then tame; but if the day be gloomy, they make their appearance in the morning. They are said to be very injurious to young trees. An old male killed at Maldonado, weighed 1 lb. 3 oz. In all the specimens I saw there, (during June, or winter,) I observed, that the hair was attached to the skin less firmly than in any other animal I remember to have seen."—D.

## 2. CAVIA PATACHONICA.

*Cavia Patachonica*, *Shaw*, General Zoology, vol. ii., part 1, p. 226.  
*Dasyprocta Patachonica*, *Desmarest*, Mamm. p. 358, Sp. 574.  
*Dolichotis*——— in Note, p. 359-360  
*Chloromys Patachonicus*, *Lesson*, Manuel de Mammalogie, p. 301.  
 Lièvre Pampa, *Azara*, Essais sur l'Histoire Naturelle des Quad. de la Province  
 du Paraguay. French Translation, vol. ii. p. 51.

In the form of the cranium, and in the structure of the teeth, this animal possesses all the characters of the Cavies (*Caviidæ*).\*

Habitat, Patagonia.

\* See Proceedings of the Zoological Society for April, 1839, p. 61.



"This animal is found only where the country has rather a desert character. It is a common feature in the landscape of Patagonia, to see in the distance two or three of these Cavies hopping one after another in a straight line over the gravelly plains, thinly clothed by a few thorny bushes and a withered herbage. Near the coast of the Atlantic, the northern limit of this species is formed by the Sierra Tapalguen, in latitude  $37^{\circ} 30'$ , where the plains rather suddenly become greener and more humid. The limit certainly depends on this change, since near Mendoza, ( $33^{\circ} 30'$ ) four degrees further northward, where the country is very sterile, this animal again occurs. Azara erroneously supposed that its northern range was only  $35^{\circ}$ .\* It is not clear on what circumstances its limit southward between Ports Desire and St. Julian (about  $48^{\circ} 30'$ ) depends; for there is in that part no change in the features of the country. It is, moreover, a singular circumstance, that although the Cavy was not seen at Port St. Julian during our voyage, yet Capt. Wood, in 1670, speaks of them as being numerous there. What cause can have altered, in a wide, uninhabited, and rarely visited country, the range of an animal like this?

"Azara states,† that the Cavy never excavates its own burrow, but uses that of the Bizcacha. Wherever this animal is present, without doubt this is true; but on the sandy plains of Bahia Blanca, where the Bizcacha is not found, the Spaniards maintain that the Cavy is its own workman. The same thing occurs with the little owls of the Pampas (*Noctua cunicularia*), which have been described by travellers as standing like sentinels at the mouths of almost every burrow; for in Banda Oriental, owing to the absence of the Bizcacha, these birds are obliged to hollow out their own habitations. Azara says, also, that this Cavy, except when pressed by danger, does not enter its burrow; on this point I must again differ from that high authority. At Bahia Blanca I have repeatedly seen two or three of these animals sitting on their haunches by the mouths of their holes, which they quietly entered as I passed by at a distance. Daily, in the neighbourhood of these spots, the Cavies were abundant: but differently from most burrowing animals, they wander, commonly two or three together, to miles or leagues from their home; nor do I know whether they return at night. The Cavy feeds and roams about by day; is shy and watchful; seldom squats after the manner of a hare; cannot run very fast, and, therefore, is frequently caught by a couple of dogs, even of mixed breed. Its manner of running more resembles that of a rabbit than of a hare. The Cavy generally produces two young ones at a birth, which are brought forth within the burrow. The flesh, when cooked, is

\* Azara, Voyage dans l'Amérique Méridionale, vol. i. p. 318.

† Azara, Quadrupeds of Paraguay.

very white; it is, however, rather tasteless and dry. Full grown animals weigh between twenty and twenty-six pounds.—D.

#### HYDROCHÆRUS CAPYBARA.

*Hydrochoerus Capybara, Auct.*

"These animals are common wherever there are large rivers or lakes, over that part of the South American Continent which lies between the Orinoco and the Plata, a distance of nearly 1400 miles. They are not generally supposed to extend south of the Plata; but as there is a Laguna Carpincho (the latter being the provincial name of the Capybara) high up the Salado, I presume they have sometimes been seen there. Azara does not believe they ever frequent salt water; but I shot one in the Bay of Monte Video; and several were seen by the officers of the Beagle on the Island of Guritti, off Maldonado, where the water is very nearly as salt as in the sea. The one I shot, at Monte Video, was an old female; it measured from tip of snout to end of stump-like tail, 3 feet  $8\frac{1}{2}$  inches, and in girth 3 feet 2 inches. She weighed 98 pounds. I opened the stomachs of a couple, which I killed near a lake at Maldonado, and found them distended with a thin yellowish-green fluid, in which not more than a trace of a vegetable fibre could be distinguished: it is in accordance with this fact, that a part of the œsophagus is so narrow, as I am informed by Mr. Owen, that scarcely anything larger than a crow-quill can be passed down it. The shape of the dung of these animals is a short straight cylinder, rounded at the extremities; when dried and burnt, it affords a pleasant smell like that from cedar wood. These animals do not burrow holes, but live amongst the thickets, or beds of rushes near rivers and lakes. At Maldonado they often may be seen during the day, seated on the grassy plain in small groups of three and four, at the distance of a few yards from the border of the lake, which they frequent. I must refer the reader for a few more details respecting their habits, to my Journal of Researches.—D."



## SECTION — LEPORINA.

## FAMILY — LEPORIDÆ.

## LEPUS MAGELLANICUS.

*Lepus Magellanicus*, Lesson et Garnot, Zoologie du Voyage autour du Monde de la Corvette, La Coquille.

“A black variety of the domesticated species, which was turned out on these islands by the earlier colonists, has been considered, but with some hesitation, by M. Lesson, as a distinct species. He has called it *Lepus Magellanicus*, and has given the following specific character, — ‘*Pilis omnino atro-violaceis, albis passim sparsis: auriculis fuscis, capite brevioribus; maculâ albâ naso, interstitio narium, menti, gulæ, frontique.*’\* In the specimens preserved on board the Beagle, the form and position of the white marks neither agree with M. Lesson’s description, nor with each other. In one there is a broad white patch on one side of the head, and another on one of the hinder thighs. The Spaniards employed in hunting wild cattle, (who are all excellent practical observers) assured me, that the black rabbits were only varieties of the common gray kind, and they gave the following reasons for thinking so; — namely, that the two sorts did not live apart; that the black one had not a different range from the other; that the two bred freely together, and that they produced pie-bald offspring. As the rabbits extend their range very slowly, (not having yet crossed the central range,) the Spaniards have sometimes carried a few and turned them out in different parts of the island, and thus they have ascertained that the black and gray kinds breed together freely. Bougainville, moreover, who visited the part of the island, where the black variety is now most common, distinctly states, in his voyage round the world, that no animal, excepting the great wolf-like fox inhabited these islands. M. Lesson supposes that the *Lepus Magellanicus* is found near the Strait of Magellan; but I inquired of the Indians, who live there, and they knew of no other ‘conejos’ or rabbits, except the *Kerodon Kingii*, which no doubt is the animal alluded to by the early voyagers.”—D.

## 1. DASYPUS HYBRIDUS.

*Dasypus hybridus*, Auct.

“This species seems to prefer rocky and slightly undulating ground, and

\* Voyage de La Coquille. Partie Zoologique, vol. i. p. 168.

hence is common in Banda Oriental and Entre Rios. Azara says it is found from 26° 30', to at least 41° south; but, I was assured, perhaps incorrectly, that the Sierra Tapalguen (37° 30'), where the nature of the country becomes slightly different, is its southern limit. The *D. villosus*, *minutus*, and *mataco*, are found at Bahia Blanca, in latitude 39°. I was also assured that these three species, together with the *D. hybridus*, frequent the plains near Mendoza, in latitude 33° to 34°.”—D.

## 2. DASYPUS MINUTUS.

*Dasypus minutus*, Auct.

“The northern limit of this species on the Atlantic side of the continent, is (as I was told by the inhabitants) near the southern one of the *D. hybridus*, namely, 37° 30'. It is extremely abundant on the arid plains near the Sierra Ventana, and likewise in the neighbourhood of the Rio Negro. This species has a range considerably further southward than any other: I obtained specimens at Port Desire, where, however, it is far from common, and at Santa Cruz (in latitude 50°) I saw its tessellated covering lying on the ground. At Bahia Blanca, I found in the stomach of this armadillo, coleoptera, larvæ, roots of plants, and even a small snake of the genus *Amphisbæna*. All the species, excepting one, wander about by day. At Bahia Blanca, during a morning’s ride, three or four of the *D. minutus* generally were met with; but, in order to secure them, it was necessary to jump off one’s horse as quickly as possible, otherwise, they would have disappeared by burrowing in the sandy soil. This species often endeavours to escape detection by squatting close to the ground, and remaining motionless.”—D.

## 1. DIDELPHIS AZARÆ.

*Didelphis Azaræ*, Auct.

“This species is said to inhabit burrows: it is nocturnal, and is very destructive to poultry. The body after death possesses a very offensive odour. My specimen was procured at Maldonado.”—D.



## 2. DIDELPHIS CRASSICAUDATA.

## PLATE XXX.

*Didelphis crassicaudata*, Desmarest, Nouv. Dict. d'Hist. Nat. 2d Ed. ix. p. 425.

Mammalogie, p. 257, Species 393.

Micouré troisième, ou Macouré à grosse queue, Azara, Essais sur l'Histoire Nat. des Quad. de la Province de Paraguay, vol. i. p. 284.

*D. capite brevi; auribus parvis; colore corporis fuscescenti-flavo subitè pallidior; infra oculos flavescens; caudâ crassâ, caput corpusque, quoad longitudinem, fere æquante; ad basin corporis colore tinctâ, dein nigra, ad apicem albâ.*

DESCRIPTION.—Head short; ears small, the posterior edge emarginated near the base, distinctly furnished with hairs; tail slightly exceeding the body in length, very thick at the base; tarsi small; fur moderately long, slightly harsh, and somewhat adpressed (much less woolly than in most Opossums): general tint brownish yellow, under parts paler; anterior angle of the eye and muzzle brown, the tip of the chin, and also the tip of the muzzle on either side whitish; on the cheeks, a little below the eyes, is a patch of yellow which extends round the angle of the mouth: about one-third of the tail is covered with fur of the same colour and character as that on the body; beyond this the tail is black, excepting a small portion, about one inch in length, at the apex, which is white; and the hairs are short, closely adpressed, and scarcely hide the scales which are beneath: the fore portion of each foot is brown: the hairs covering the ears on the outer side are brownish, and those on the inner side of the ear are yellow, but towards the outer margin they are brown. The hairs of the back have the basal half gray, and the apical half ochreous, terminating in yellowish brown; on the belly and underside of neck, the hairs are ochreous, faintly tinted with gray at the base.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	1	3	Length of tarsus	1	5½
of tail	10	3	of ear	0	6
from nose to ear	2	1½			

Habitat, Maldonado, La Plata, (June).

The species described by Azara, under the name *Macouré à grosse queue*, agrees so perfectly with the present animal, that I have no hesitation in referring

it to the *Didelphis crassicaudata* of Desmarest, which is founded upon Azara's description.

The head of the *Didelphis crassicaudata* is shorter and less pointed than in most other Opossums; the ears are unusually small, and the tail is very thick. In the character of the fur also, this species differs from most others, the hairs being rather short and somewhat adpressed; and the soft under-fur being very scanty. Upon separating the fur on the back and sides of the body, numerous young hairs were visible in the specimen from which the above description is taken, and these were of a bright rusty red tint; the colouring of the animal therefore would, in all probability, have been very different after a short time, had it not been killed. Those observed by Azara varied considerably in their colouring. The skull is figured in Plate 34. figs. 25. Fig. d represents a ramus of the lower jaw.

	In.	Lines.
Length of the skull	2	4
Width	1	3
Length of nasal bones	0	9½
— of palate	1	2¾
Width of palate between the posterior molars	0	5
Distance between forepart of front incisors and forepart of canine	2	0¾
Distance between forepart of canine and hinder part of last molar	1	0
Length of ramus of lower jaw (incisors not included)	1	10½

"This specimen was caught at Maldonado: it weighed 14½ oz."—D.

## 3. DIDELPHIS ELEGANS.

## PLATE XXXI.

*D. vellere longo et molli, corpore suprà cinereo-fuscescente lavato; pedibus corporeque subitè albis, oculis nigro circumdati, interspatio cinerescens; auribus magnis fuscescentibus; caudâ, capite et corpore, paulo brevior.*

DESCRIPTION.—Muzzle slender and pointed; ears large; tail rather shorter than the head and body taken together; fur long and very soft: general tint of the upper parts of the head and body ashy-gray washed with brown; on the sides of the body, especially near the shoulders, a faint yellowish tint is observable; the lower part of the cheeks, the throat, under parts of the body and the feet, are white, with an indistinct yellowish tint; the eyes are encircled with brownish-black, which tint is extended forwards on to the sides of the muzzle; the upper surface of the muzzle and the inter-orbital space is



pale. The tail is furnished throughout with minute decumbent hairs, excepting a small naked space at the tip beneath, of about one line in length; on the upper surface they are brown, and on the under, they are whitish. The fur of the upper and under parts of the body is deep gray at the base; on the lower part of the cheeks, chin, and on the mesial line of the throat and chest, the hairs are uniform—not gray at the base. The ears are brown, and to the naked eye, appear naked.

	In.	Lines.		In.	Lines.
Length from nose to root of tail	4	6	Length from nose to ear	1	1½
of tail	4	4	of ear	0	7½
of tarsus (claws included)	0	7½	width of ear	0	7½

Habitat, Valparaiso, Chile, (October.)

This little Opossum, which is the only species I am acquainted with from the west side of the Cordillera, was exhibited at one of the scientific meetings of the Zoological Society, and its characters were pointed out by Mr. James Reid, who proposed for it the specific name of *hortensis*,\* a name which was given from the circumstance that in Mr. Darwin's notes it is stated that a small Opossum was found in a garden at Maldonado. These notes however refer to the *Didelphis brachyura*. The skull of this animal is figured in Plate 35. Fig. 5, *a*, represents the upper side; 5, *b*, the under side; and 5, *c*, is the side view. Fig. 5, *d*, is the lower jaw, and 5, *e*, is the same magnified. The length of the skull is 14½ lines; width, 8 lines; length of palate, 7¼ lines; inter-orbital space, 2½ lines; length of *ramus* of lower jaw, 10½ lines. In the palate are two long openings which commence opposite the posterior false molar, and terminate opposite the hinder portion of the penultimate true molar: the incisive foramina are nearly one line in length. On the posterior portion of the palate there are four other foramina, one on each side near the posterior molar, and one on either side the mesial line, behind the large palatine openings above mentioned.

"These little animals frequent the thickets growing on the rocky hills, near Valparaiso. They are exceedingly numerous, and are easily caught in traps baited either with cheese or meat. The tail appeared to be scarcely at all used as a prehensile organ; they are able to run up trees, with some degree of facility. I could distinguish in their stomachs the larvæ of beetles."—D.

\* See Proceedings of the Zoological Society of London for January, 1837, p. 4.; its characters were not published.

## 4. DIDELPHIS BRACHYURA.

## PLATE XXII.

*Didelphis brachyura*, Auct.

*D. vellere brevi*, corporis suprà cinereo, flavo lavato; lateribus capitis, corporisque, et partibus inferioribus rufescenti-flavis, gula et abdomine pallidioribus; caudâ brevi.

DESCRIPTION.—Head large; canine teeth very large; ears rather small; tail short, rather more than half the length of the body; fur short and crisp; the back and upper surface of the head ashy gray, grizzled with yellowish white; the sides of the head and body, and under parts rusty yellow, rather paler on the belly than on other parts, and of a deeper hue on the rump and cheeks; the eye is encircled with rusty yellow; feet yellowish; tail clothed with short stiff hairs, and exhibiting scales, brownish above, and dirty yellowish white beneath—a small naked space beneath, at the tip, of about two lines in length. Fur of the back grayish at the base, that on the belly uniform; ears clothed with minute yellowish white hairs.

	In.	Lines.		In.	Lines.
Length from nose to the root of tail	6	0	Length of tarsus (claws included)	0	8¾
from nose to ears	1	6	of ear	0	3¾
of tail	2	8			

Habitat, Maldonado, La Plata, (June.)

Never having seen a good figure of this animal, I have thought it desirable to introduce it in the plates of this work.

The *Didelphis brachyura* is closely allied to the *D. tricolor* of authors, but in that species the upper parts of the body are nearly black; the sides of the head and body are of a deep rusty red tint, and the under parts are almost white.

"Was caught by some boys digging in a garden. Its intestines were full of the remains of insects, chiefly ants and others of the Hemipterous order."—D.



4. *Thomomys talpiformis*.

PLATE XXII.

*Thomomys talpiformis*, Linn.

1. Skull, from above, showing the position of the orbits, the shape of the zygomatic arches, and the position of the teeth.

2. Head, from above, showing the position of the eyes, the shape of the snout, and the position of the teeth.

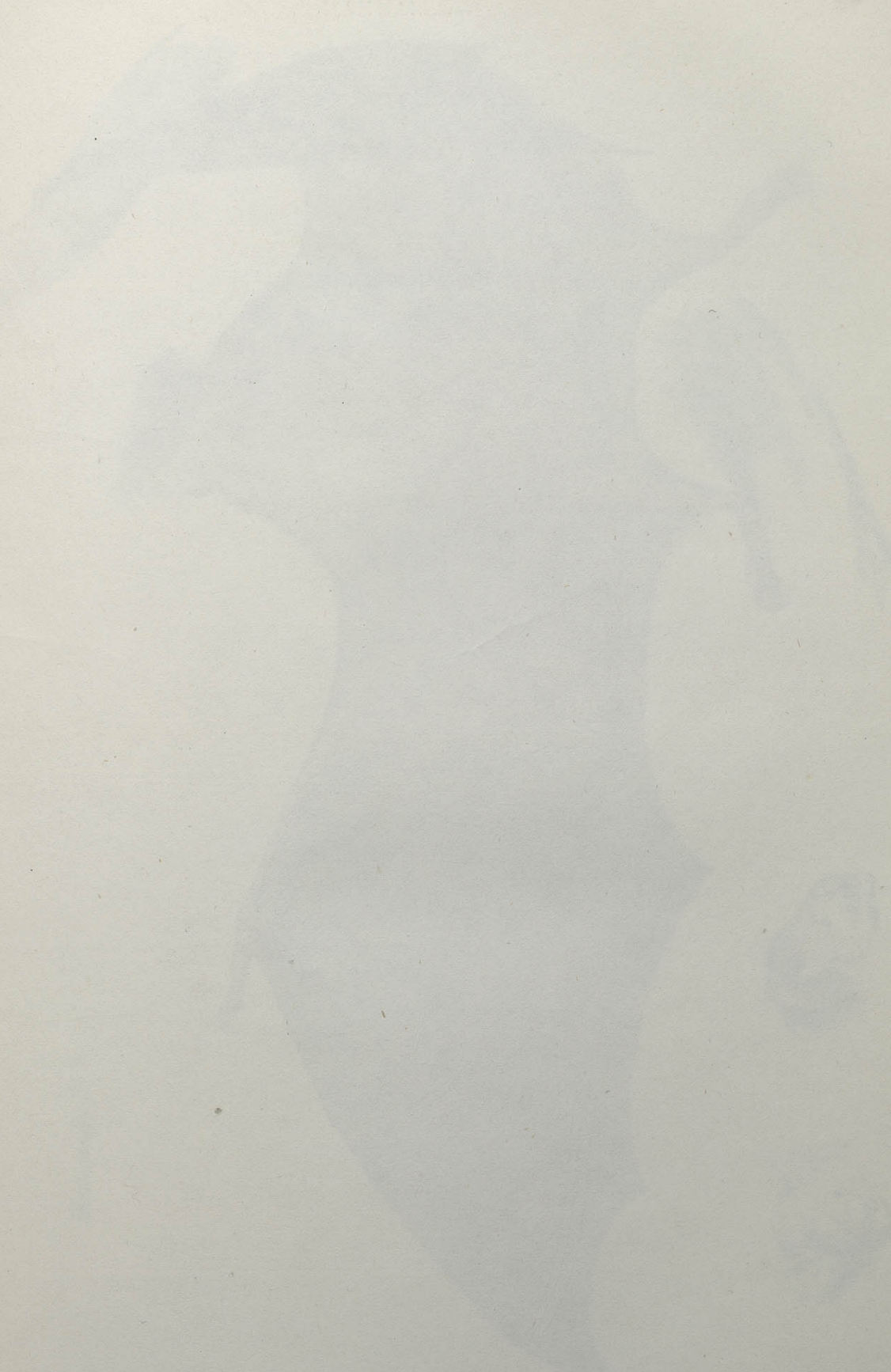
3. Head, from the side, showing the position of the eye, the shape of the snout, and the position of the teeth.

Habitat, Montana, La Platte, (Coe).

Never having seen a good figure of this animal, I have thought it desirable to introduce it in the plates of this work.

The *Thomomys talpiformis* is closely allied to the *T. talpiformis* of authors, but in that species the upper part of the body is nearly black; the sides of the head and body are of a deep rusty red; and the under parts are almost white.

Was caught by some boys, living in a garden. Its intestines were full of the remains of insects, chiefly ants and others of the *Formicidae* order.







*Desmodus D'Orbigny.*

*Mammalia Pl. 1*



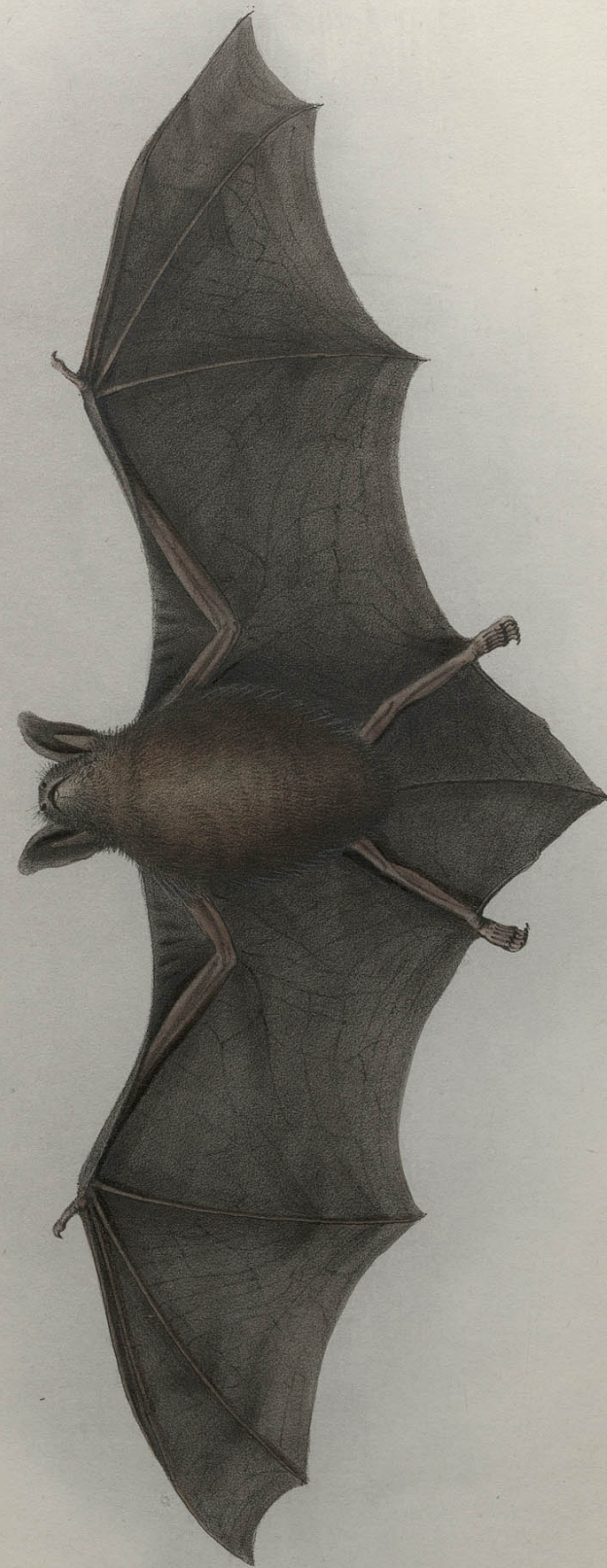
*Mammalia Pl. 2.*



*Phyllostoma Grayi.*



*Myotis*, Pl. 3.



*Vespertilio Chilensis*.





*Canis arcticus.*

*Mammalia Pl. 4.*



*Mammalia Pl. 5.*



*Canis Magellanicus.*



*Uanindia P. 6*



*Canis fulvipes.*





*Canis Agilis.*

*Mammalia Pl. 2.*



*Mammalia. Pl. 8.*



*Felis Yagouaroundi.*





*Manisodon* Pl. 9.

*Felis tigris*.



*Manimada. Pl. 10.*



*Delphinus Fize-Roy.*



*Mammalia Pl.*



*Mus gualipes*

*Mus longicaudatus*





*Mus elegans.*

*Mus bimaculatus.*



Mammalia Pl. 43.



*Mus arvensis*.

*Mus flavesceus*.



*Mammalia Pl. 14.*



*Mus brachyotus.*

*Mus magellanicus.*



2



1. *Mus Renggeri.*  
2. *obscurus.*



*Mammalia Pl 16*



*Mus longipes*





Fig 1. *Mus canthorhinus* 2. *Mus nasutus*.



*Mammalia Pl. 18.*



*Mus musculus*



*Mammalia. Pl. 19.*



*Mus Brasiliensis.*



*Mammalia. Pl. 20.*



*Mus microps.*



*Mammalia Pl. 21.*



*Mus griseo-flavus.*



Mammalia. Pl. 22



*Mus vanthopygus*



*Mammalia Pl. 23.*



*Miss Darwin*



Mammalia. Pl. 24.



*Mus Galapagensis*



*Mammalia Pl. 25.*



*Mus fuscipes.*



Mammalia Pl. 26



*Peromyscus crinitoides*



Mammalia Pl. 27



*Peromyscus maniculatus*



*Mammalia Pl. 28.*



*Peromyscus Benettii.*



Mammalia Pl. 29



*Abrocoma Canieri*



Mammalia Pl 30.



*Didelphis oniscivora*



*Mammalia Pl 34*



*Didelphis elegans*

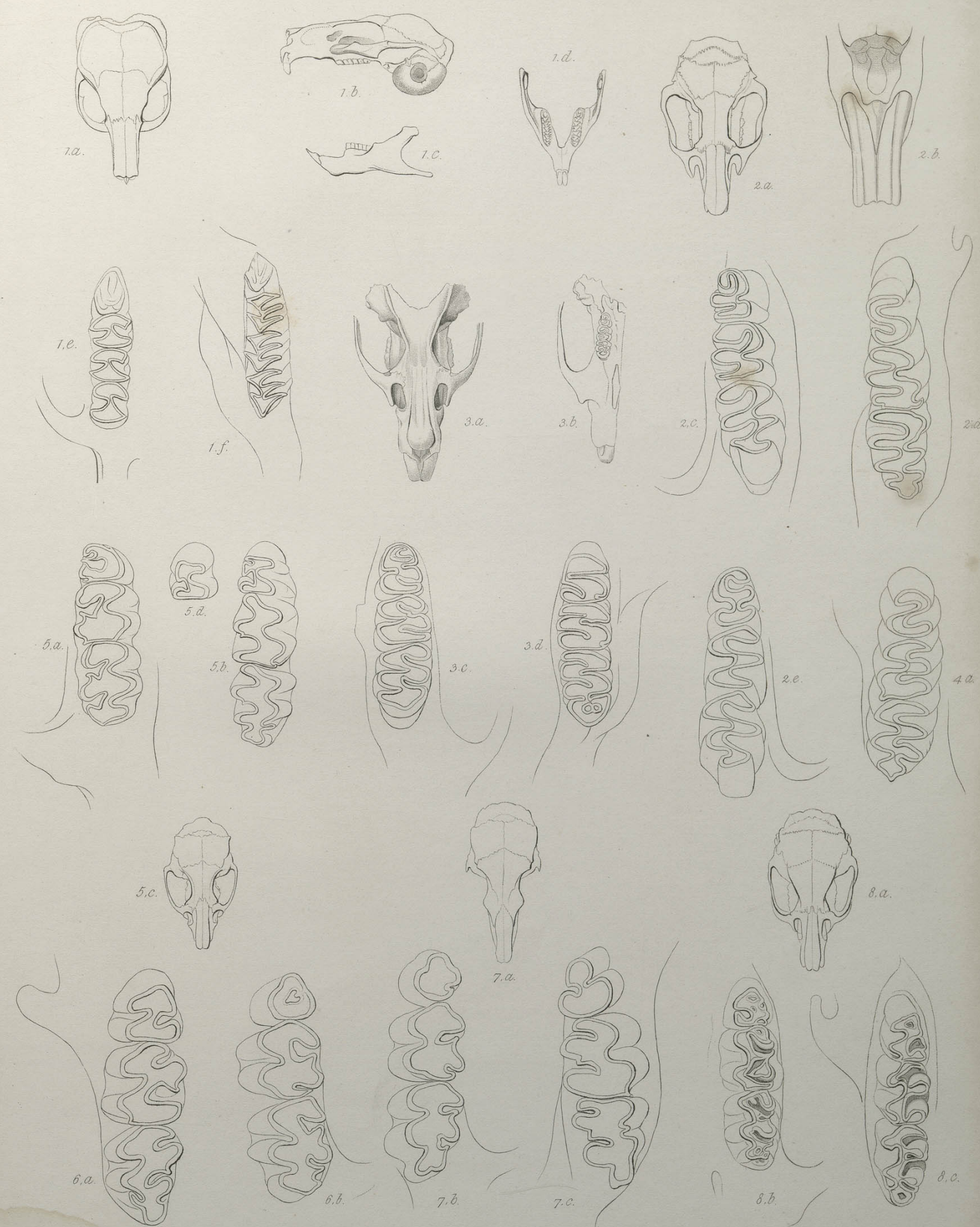


Mammalia Pl. 32



*Didelphis brachyura*

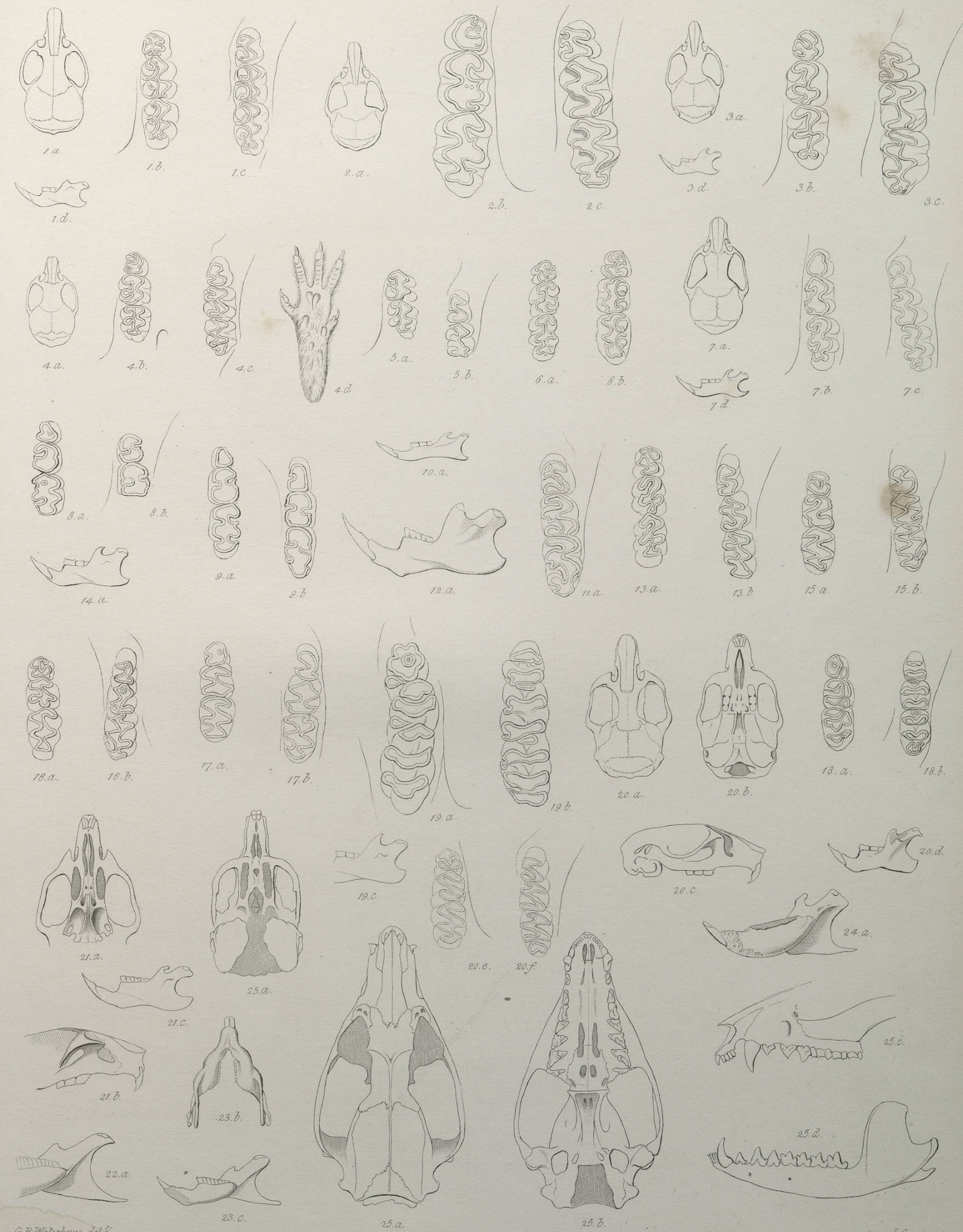




G. P. Waterhouse, & C. M. Curtis del.

J. Swaine sc.

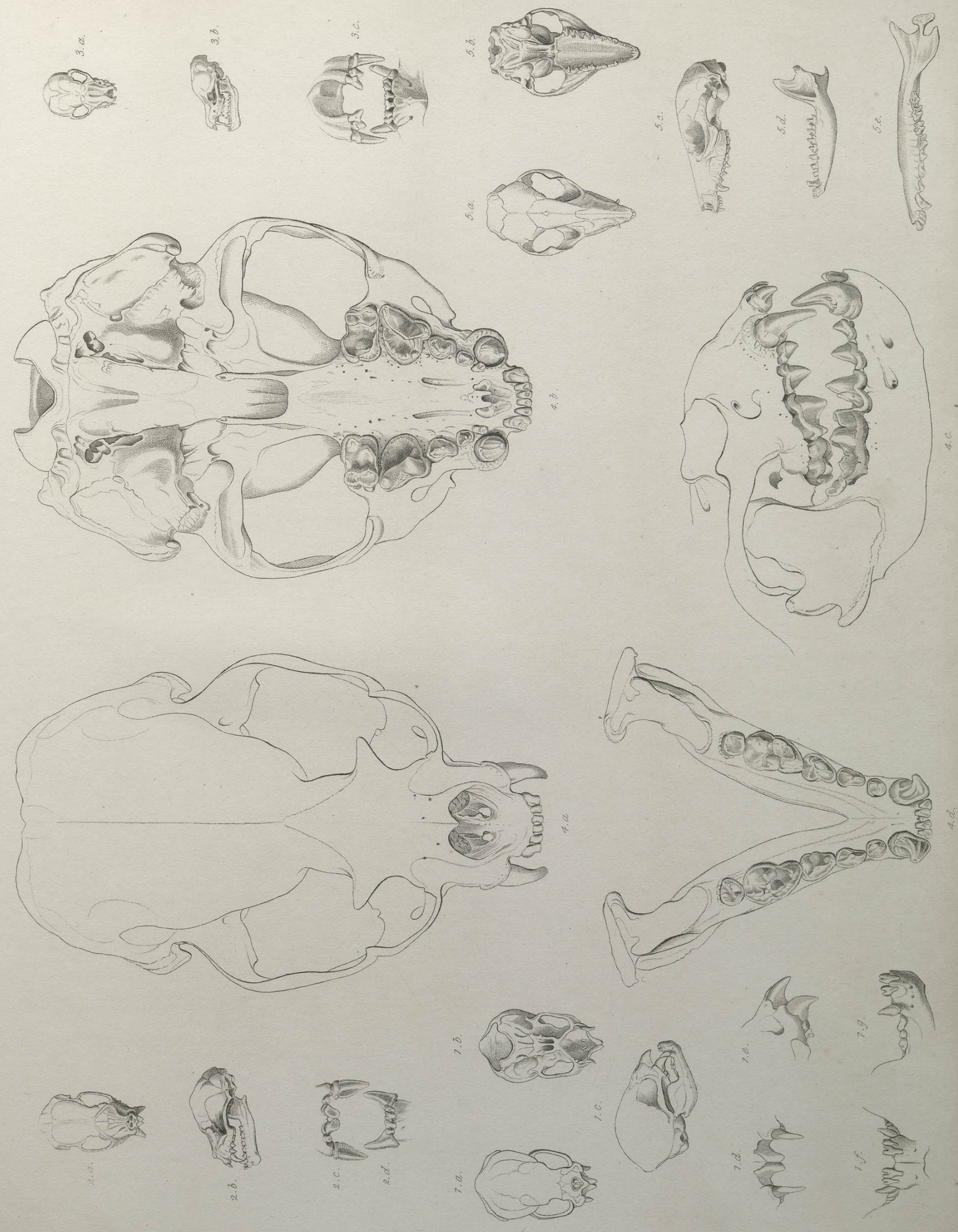




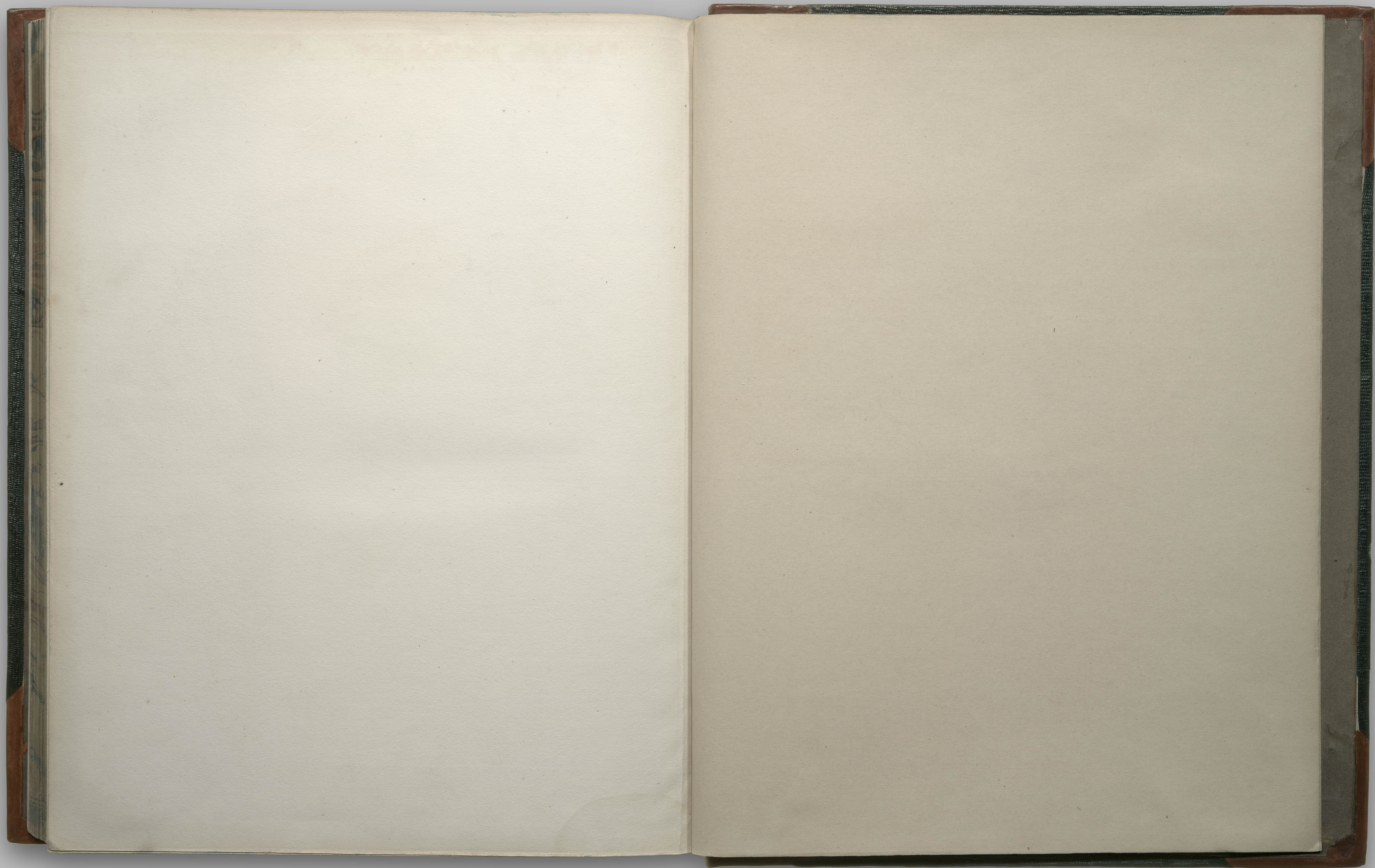
G.R. Waterhouse del.

J. Smeaton sc.

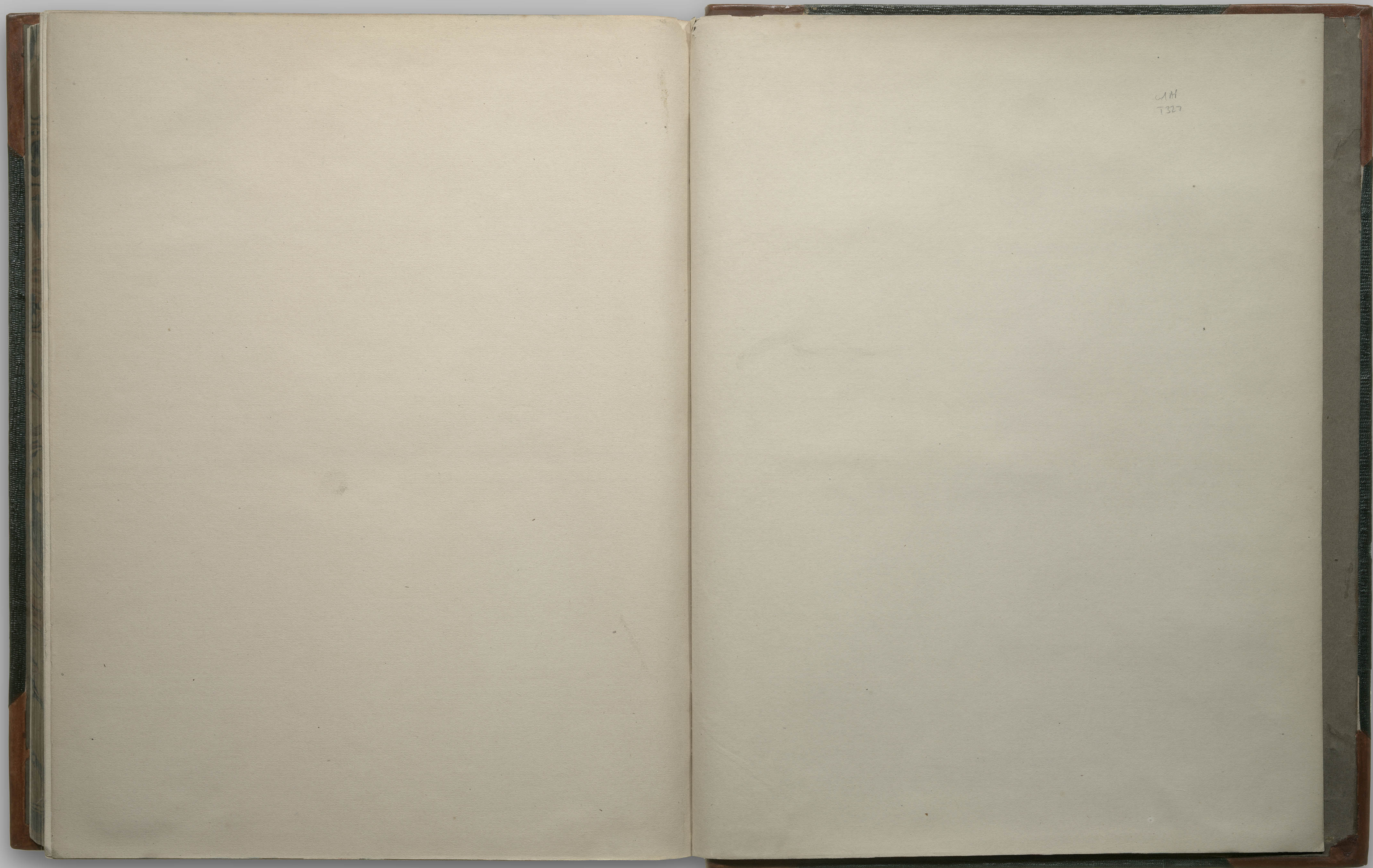




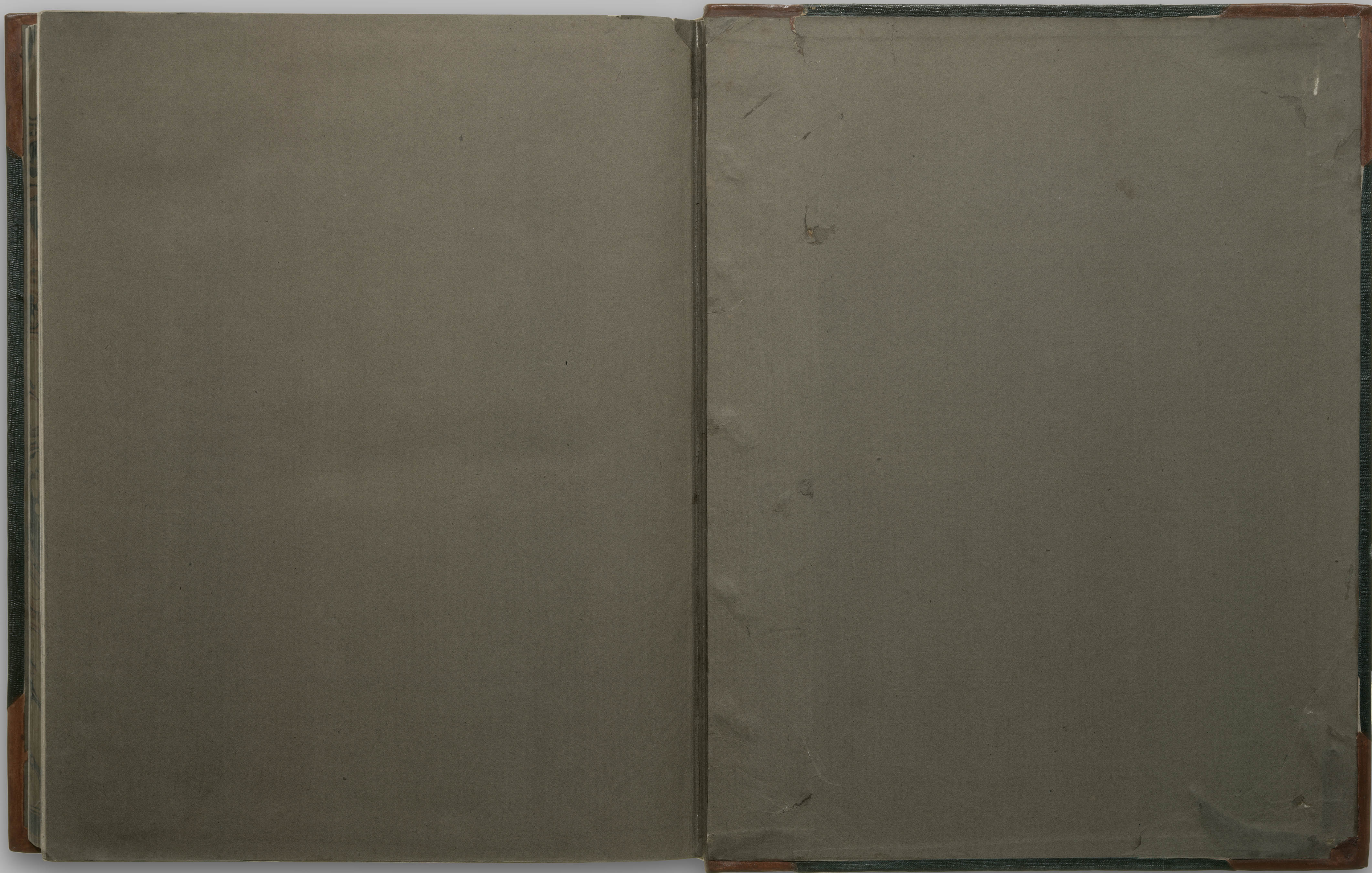














ZOOLOGY  
OF THE  
BEAGLE


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PART 4. FISH.

PART 5. REPTILES

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THE  
ZOOLOGY  
OF  
THE VOYAGE OF H.M.S. BEAGLE,

UNDER THE COMMAND OF CAPTAIN FITZROY, R.N.,

DURING THE YEARS

1832 TO 1836.

PUBLISHED WITH THE APPROVAL OF  
THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

Edited and Superintended by  
CHARLES DARWIN, ESQ. M.A. F.R.S. SEC. G.S.  
NATURALIST TO THE EXPEDITION.

PART III.  
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BY  
JOHN GOULD, ESQ. F.L.S.

LONDON:  
PUBLISHED BY SMITH, ELDER AND CO. 65, CORNHILL.  
MDCCCXLI.





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ILLUSTRATED BY NUMEROUS COLOURED ENGRAVINGS.



# CORRIGENDA.

I am indebted to Mr. G. R. Gray for the following remarks and corrections:—

- Page 13, to *Milvago ocreocephalus*, *Spix.* add  
*Polyborus ocreocephalus*, *Jard. & Selby's Ill. t. 5.*  
Alter 7, 8, 9, & 10, to 5, 6, 7, & 8.  
Page 15, *Milvago leucurus*, add  
*Falco Australis*, *Jard. & Selby's Ill. Orn. n. s.*  
pl. 24.  
Page 49, *Serpophaga*, *Gould*, is probably synonymous with  
*Euscarthmus*, *Pr. Max.*  
Page 56, *Agriornis*, *Gould*, is synonymous with *Dasycephala*  
of Swainson, and *Tamnolanius*, of Lesson; the  
species therefore should be  
sp. 1. *D. lividus*, *G. R. Gray.*  
*Thamnophilus lividus*, *Kittl. Voy. de Chili*, pl. 1.  
*Tyrannus gutturalis*, *Eyd. & Gerv. &c.*  
sp. 2. *D. striata*, *G. R. Gray.*  
*Agr. striatus*, *Gould.*  
*Agr. micropterus*, *juv. Gould*, sp. 3.  
Page 57, sp. 4. *D. maritima*, *G. R. Gray.*  
*Agr. maritimus*, *G. R. Gray*, &c.  
Page 66. The generic appellation of *Opetiorhynchus*, was  
adopted after the subjection of Mr. Gould; since  
its publication, however, I have considered that it  
might cause confusion with *Furnarius*, of Vieillot,  
as it is Temminck's name for the identical same  
division, therefore only a synonym, and am on

- that ground induced to change and propose the  
name of *Cinclodes*, which has been adopted by a  
Continental writer. The species should be altered  
thus:—  
Page 66, Sp. 1. *Cinclodes vulgaris*, *G. R. Gray.*  
Page 67, sp. 2. *C. Patagonicus*, *G. R. Gray, List of the*  
*Genera of Birds.*  
sp. 3. *C. antarcticus*, *G. R. Gray.*  
*Cinclodes fuliginosus*, *Less.*  
Page 68, sp. 4. *C. nigrofumosus*, *G. R. Gray.*  
Page 69, *Eremobius*, being previously employed, it is changed  
to *Enicornis*, *G. R. Gray.* The species to  
*En. phoenicurus*, *G. R. Gray, List of the Genera*  
*of Birds.*  
Page 70, *Rhinomya*, being also previously employed; it is  
therefore changed to *Rhinocrypta*, *G. R. Gray.*  
The species to  
*R. lanceolata*, *G. R. Gray.*  
Page 76, for *Synallaxis major*, *Gould*, read *Anumbius acuti-*  
*caudatus*, *G. R. Gray.*  
*Furnarius annumbi*, *Vieill.*  
*L'Anumbi*, *Azara*, No. 222.  
*Anthus acuticaudatus*, *Less.*  
*Anumbius anthoides*, *D'Orb. & Lefr.*  
Page 94, *Fringilla fruticeti*, *Kittl.* gives place to  
*Fringilla erythrorhyncha*, *Less. Voy. Thetis*, ii. p. 324.



## LIST OF PLATES.

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| XVII. ——— <i>melanotis</i> .                               | XL. <i>Camarhynchus psittaculus</i> .                 |
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| XIX. { <i>Uppucerthia dumetoria</i> , <i>in place of</i>   | XLII. <i>Cactornis scandens</i> .                     |
| <i>Upercethia dumetaria</i> .                              | XLIII. ——— <i>assimilis</i> .                         |
| XX. { <i>Opetiorhynchus nigrofumosus</i> ,                 | XLIV. <i>Certhidea olivacea</i> .                     |
| <i>in place of</i>   | XLV. <i>Xanthornus flaviceps</i> .                    |
| <i>Opetiorhynchus lanceolatus</i> .                        | XLVI. <i>Zenaida Galapagoensis</i> .                  |
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The accompanying illustrations, which are fifty in number, were taken from sketches made by Mr. Gould himself, and executed on stone by Mrs. Gould, with



that admirable success, which has attended all her works. They are all of the natural size with the exception of four raptorial birds, a goose and a species of Rhea. As the dimensions of these latter birds are given, their proportional reduction will readily be seen. I had originally intended to have added the initial letter of my name to the account of the habits and ranges, and that of Mr. Gould's to the description of the genera and species; but as it may be known that he is responsible for the latter, and myself for the former, this appeared to me useless; and I have, therefore, thought it better to incorporate all general remarks in my own name, stating on every occasion my authority, so that wherever the personal pronoun is used it refers to myself. Finally, I must remark, that after the excellent dissertation, now in the course of publication, on the habits and distribution of the birds of South America by M. Alcide D'Orbigny, in which he has combined his own extended observations with those of Azara, my endeavour to add anything to our information on this subject, may at first be thought superfluous. But as during the Beagle's voyage, I visited some portions of America south of the range of M. D'Orbigny's travels, I shall relate in order the few facts, which I have been enabled to collect together; and these, if not new, may at least tend to confirm former accounts. I have, however, thought myself obliged to omit some parts, which otherwise I should have given; and, after having read the published portion of M. D'Orbigny's great work, I have corrected some errors, into which I had fallen. I have not, however, altered any thing simply because it differs from what that gentleman may have written; but only where I have been convinced that my means of observation were inferior to his.

## B I R D S.

### FAMILY—VULTURIDÆ.

SARCORAMPHUS GRYPHUS. *Bonap.*

Vultur gryphus, *Linn.*

—, *Humb.* Zoolog. p. 31.

Sarcoramphus Condor, *D'Orbigny.* Voy. Ois.

Condor of the inhabitants of South America.

THE Condor is known to have a wide range, being found on the west coast of South America, from the Strait of Magellan, throughout the range of the Cordillera, as far, according to M. D'Orbigny, as 8° north latitude. On the Patagonian shore, the steep cliff near the mouth of the Rio Negro, in latitude 41°, was the most northern point where I ever saw these birds, or heard of their existence; and they have there wandered about four hundred miles from the great central line of their habitation in the Andes. Further south, among the bold precipices which form the head of Port Desire, they are not uncommon; yet only a few stragglers occasionally visit the sea-coast. A line of cliff near the mouth of the Santa Cruz is frequented by these birds, and about eighty miles up the river, where the sides of the valley were formed by steep basaltic precipices, the Condor again appeared, although in the intermediate space not one had been seen. From these and similar facts, I believe that the presence of this bird is chiefly determined by the occurrence of perpendicular cliffs. In Patagonia the Condors, either by pairs or many together, both sleep and breed on the same overhanging ledges. In Chile, however, during the greater part of the year, they haunt the lower country, near the shores of the Pacific, and at night several roost in one tree; but in the early part of summer they retire to the most inaccessible parts of the inner Cordillera, there to breed in peace.



With respect to their propagation, I was told by the country people in Chile, that the Condor makes no sort of nest, but in the months of November and December, lays two large white eggs on a shelf of bare rock. Certainly, on the Patagonian coast, I could not see any sort of nest among the cliffs, where the young ones were standing. I was told that the young Condors could not fly for a whole year, but this probably was a mistake, since M. D'Orbigny says they take to the wing in about a month and a half after being hatched. On the fifth of March (corresponding to our September), I saw a young bird at Concepcion, which, though in size only little inferior to a full-grown one, was completely covered by down, like that of a gosling, but of a blackish colour. I can, however, scarcely believe that this bird could have used, for some months subsequently, its wings for flight. After the period when the young Condor can fly, apparently as well as the old birds, they yet remain (as I observed in Patagonia) both roosting at night on the same ledge, and hunting by day with their parents: but before the young bird has the ruff round its neck white, it may often be seen hunting by itself. At the mouth of the Santa Cruz, during part of April and May, a pair of old birds might be seen every day, either perched on a certain ledge, or sailing about in company with a single young one, which latter, though full fledged, had not its ruff white.

The Condors generally live by pairs; but among the basaltic cliffs of the plains, high up the river Santa Cruz, I found a spot where scores must usually haunt. They were not shy; and on coming suddenly to the brow of the precipice, it was a fine sight to see between twenty and thirty of these great\* birds start heavily from their resting place, and wheel away in majestic circles. From the large quantity of dung on the rocks, they must have long frequented this cliff; and probably they both roost and breed there. Having gorged themselves with carrion on the plains below, they retire to these favourite ledges to digest their food in quietness. From these facts, the Condor must, to a certain degree be considered, like the Gallinazo (*Cathartes atratus*), a gregarious bird. In this part of the country they live almost entirely on the guanacoes, which either have died a natural death, or, as more commonly happens, have been killed by the pumas. I believe, from what I saw in Patagonia, that they do not, on ordinary occasions, extend their daily excursions to any great distance from their regular sleeping places.

The condors may oftentimes be seen at a great height, soaring over a certain spot in the most graceful spires and circles. On some occasions I am sure that they do this for their sport; but on others, the Chileno countryman tells you, that they are watching a dying animal, or the puma devouring its prey. If the condors

\* I measured a specimen, which I killed there: it was from tip to tip of wing, eight and a half feet; and from end of beak to end of tail four feet.

glide down, and then suddenly all rise together, the Chileno knows that it is the puma, which, watching the carcass, has sprung out to drive away the robbers. Besides feeding on carrion, the condors frequently attack young goats and lambs. Hence the shepherds train their dogs, the moment the enemy passes over, to run out, and looking upwards, to bark violently. The Chilenos destroy and catch numbers; two methods are used: one is to place a carcass within an enclosure of sticks on a level piece of ground, and when the condors have gorged themselves to gallop up on horseback to the entrance, and thus enclose them: for when this bird has not space to run, it cannot give its body sufficient momentum to rise from the ground. The second method is to mark the trees in which, frequently to the number of five or six, they roost together, and then at night to climb up and noose them; they are such heavy sleepers, as I have myself witnessed, that this is not a difficult task. At Valparaiso I have seen a living condor sold for sixpence, but the common price is eight or ten shillings. One which I saw brought in for sale, had been lashed with a rope, and was much injured; but the moment the line was cut by which its bill was secured, it began, although surrounded by people, ravenously to tear a piece of carrion. In a garden at the same place, between twenty and thirty of these birds were kept alive; they were fed only once a week, yet they appeared to be in pretty good health.\* The Chileno countrymen assert, that the condor will live and retain its powers between five and six weeks without eating: I cannot answer for the truth of this fact, but it is a cruel experiment, which very likely has been tried.

When an animal is killed in this country, it is well known that the condors, like other carrion vultures, gain the intelligence and congregate in a manner which often appears inexplicable. In most cases, it must not be overlooked, that the birds have discovered their prey, and have picked the skeleton clean, before the flesh is in the least degree tainted. Remembering the opinion of M. Audubon on the deficient smelling powers of such birds,† I tried in the above mentioned garden, the following experiment. The condors were tied, each by a rope, in a long row at the bottom of a wall. Having folded a piece of meat in white paper, I walked backwards and forwards, carrying it in my hand at the

\* I noticed that several hours before any of the Condors died, all the lice with which they are infested, crawled to the outside feathers. I was told, that this always happened.

† In the case of the *Cathartes Aura*, Mr. Owen, in some notes read before the Zoological Society, (See Magazine of Nat. Hist. New Ser. vol. i. p. 638.) has demonstrated from the developed form of the olfactory nerves, that this bird must possess an acute sense of smell. It was mentioned on the same evening, in a communication from Mr. Sells, that on two occasions, persons in the West Indies having died, and their bodies not being buried till they smelt offensively, these birds congregated in numbers on the roof of the house. This instance appears quite conclusive, as it was certain, from the construction of the buildings, that they must have gained the intelligence by the sense of smell alone, and not by that of sight. It would appear from the various facts recorded, that carrion-feeding hawks possess both senses, in a very high degree.



distance of about three yards from them ; but no notice whatever was taken of it. I then threw it on the ground within one yard of an old cock bird ; he looked at it for a moment with attention, but then regarded it no more. With a stick I pushed it closer and closer, until at last he touched it with his beak : the paper was then instantly torn off with fury, and at the same moment every bird in the long row began struggling and flapping its wings. Under the same circumstances, it would have been quite impossible to have deceived a dog.

When the condors in a flock are wheeling round and round any spot, their flight is beautiful. Except when they rise from the ground, I do not recollect ever to have seen one flap its wings. Near Lima, I watched several of these birds for a quarter and half-an-hour, without once taking off my eyes. They moved in large curves, sweeping in circles, descending and ascending without once flapping. As several glided close over my head, I intently watched, from an oblique position, the separate and terminal feathers of the wing ; if there had been the least vibratory movement, their outlines would have been blended together, but they were seen distinct against the blue sky. The head and neck were moved frequently, and apparently with force. If the bird wished to descend, the wings were for a moment collapsed ; and then, when again expanded with an altered inclination, the momentum gained by the rapid descent, seemed to urge the bird upwards, with the even and steady movement of a paper kite. It was a beautiful spectacle thus to behold these great vultures hour after hour, without any apparent exertion, wheeling and gliding over mountain and river.

In the garden at Valparaiso, where so many condors were kept alive, I observed that all the hens had the iris of their eyes bright red, but the cocks yellowish-brown. In a young bird, whose back was brown, and ruff not white, (but which must have been at least nearly a year old, as it was then the spring) I observed that the eye was dark brown : upon examination after death, this proved to be a female, and therefore I suppose the colour of the iris changes at the same time with the plumage.

# 1. CATHARTES ATRATUS. *Rich. and Swain.*

*Cathartes urubu*, *D'Orbigny*. Voy. Ois.

*Vultur atratus*, *Bartram*, p. 287.

——— *jota*, *Jardine's Wilson*, vol. iii. p. 236.

———, *Bonaparte's List*, p. 1.

Gallinazo or Cuervo of the Spanish inhabitants of America ; and Black Vulture or Carrion Crow of the English of that continent.

THESE birds, I believe, are never found further south, than the neighbourhood of the Rio Negro, in latitude 41° : I never saw one in southern Patagonia, or in Tierra del Fuego. They appear to prefer damp places, especially the vicinity of rivers ; and thus, although abundant both at the Rio Negro and Colorado, they are not found on the intermediate plains. Azara\* states, that there existed a tradition in his time, that on the first arrival of the Spaniards in the Plata, these birds were not found in the neighbourhood of Monte Video, but that they subsequently followed the inhabitants from more northern districts. M. Al. D'Orbigny, in reference to this statement, observes that these vultures, although common on the northern bank of the Plata, and likewise on the rivers south of it, are not found in the neighbourhood of Buenos Ayres, where the immense slaughtering establishments are attended by infinite numbers of Polybori and gulls. M. D'Orbigny supposes that their absence is owing to the scarcity of trees and bushes in the Pampas ; but this view, I think, will hardly hold good, inasmuch as the country near Bahia Blanca, where the Gallinazo (together with the carrion-feeding gull) is common, is as bare, if not more so, than the plains near Buenos Ayres. I have never seen the Gallinazo in Chile ; and Molina, who was aware of the difference between the *C. atratus* and *C. aura*, has not noticed it ; yet, on the opposite side of the Cordillera, near Mendoza, it is common. They do not occur in Chiloe, or on the west coast of the continent south of that island. In Wilson's Ornithology it is said that "the carrion crow (as this bird is called in the United States) is seldom found on the Atlantic to the northward of Newbern, lat. 35° North Carolina." But in Richardson's "Fauna Boreali-Americana," it is mentioned, on the authority of Mr. David Douglas, that on the Pacific side of the continent, it is common on the marshy islands of the Columbia, and in the neighbourhood of Lewis's and Clark's rivers (45°—47° N.) It has, therefore, a wider range in the northern

\* Voyage dans l'Amérique Méridionale, vol. iii. p. 24.



than in the southern half of the continent. These vultures certainly are gregarious; for they seem to have pleasure in each other's society, and are not solely brought together by the attraction of a common prey. On a fine day, a flock may often be seen at a great height; each bird wheeling round and round in the most graceful evolutions. This is evidently done for their sport; or, perhaps, is connected (for a similar habit may sometimes be observed during the breeding season amongst our common rooks) with their matrimonial alliances.

## 2. CATHARTES AURA. *Ill.*

*Vultur aura*, *Linn.*

—, *Jardine's Wilson*, vol. iii. p. 226.

*Vultur jota*, *Molina*, Compendio de la Hist. del Reyno de Chile, vol i. p. 296.

Turkey-buzzard and Carrion Crow of the English in America.

THIS bird has a wide geographical range, being found from 55° S. to Nova Scotia (according to Wilson, in Jardine's edition, vol. iii. p. 231,) in 45° N.; or exactly one hundred degrees of latitude. Its lesser range in Northern than in Southern America is probably due to the more excessive nature of the climate in the former hemisphere. It is said to be partly migratory during winter, in the Northern and even in the Middle States, and likewise on the shores of the Pacific. The *C. aura* is found in the extreme parts of Tierra del Fuego, and on the indented coast, covered with thick forests, of West Patagonia, (but not on the arid plains of Eastern Patagonia,) in Chile, where it is called Jote, in Peru, in the West Indies; and, according to Wilson, it remains even during winter, in New Jersey and Delaware, latitude 40°. It and one of the family of Polyborinæ are the only two carrion-feeding hawks, which have found their way to the Falkland Islands. The Turkey buzzard, as it is generally called by the English, may be recognized at a great distance from its lofty, soaring and most graceful flight. It is generally solitary, or, at most, sweeps over the country in pairs. In Tierra del Fuego, and on the west coast of Patagonia, it must live exclusively on what the sea throws up, and on dead seals: wherever these animals in herds were sleeping on the beach, there this vulture might be seen, patiently standing on some neighbouring rock. At the Falkland Islands it was tolerably common; but sometimes there would not be a single one near the settlement for several days together, and then many would suddenly appear. They were usually shy; a disposition which is remarkable, as being different from that of almost every other bird in this Archipelago. May we infer from this that they are migratory, like those of the northern hemisphere? In a female specimen killed there, the skin of the head was intermediate in colour between

“scarlet and cochineal red,”\* and the iris dark-coloured. D'Orbigny describes the iris as being bright scarlet; whilst Azara says it is “jaune léger.” Is this difference owing to the sex and age, as certainly is the case with the condors? As a considerable degree of confusion has prevailed in the synonyms of this and the foregoing species, caused apparently by a doubt to which of them Molina applied the name of *Jote*, I would wish to call attention to the fact, that at the present time the *C. aura* in Chile goes by the name of *Jote*. Moreover, I think Molina's description by itself might have decided the question; he says, the head of the *Vultur jota* is naked, and covered only with a wrinkled and reddish (roxiza) skin.

## FAMILY—FALCONIDÆ.

SUB-FAM. POLYBORINÆ, *Swains.*

(Caracaridæ, D'Orbigny.)

### POLYBORUS BRASILIENSIS. *Swains.*

*Polyborus vulgaris*, *Vieillot.*

*Falco Brasiliensis* Auctorum; Caracara of Azara; Tharu of Molina; and Carrancha of the inhabitants of La Plata.

THIS is one of the commonest birds in South America, and has a wide geographical range. It is found in Mexico and in the West Indies. It is also, according to M. Audubon, an occasional visitant to the Floridas; it takes its name from Brazil, but is no where so common as on the grassy savannahs of La Plata. It generally follows man, but is sometimes found even on the most desert plains of Patagonia: in the northern part of that region, numbers constantly attended the line of road between the Rio Negro and the Colorado, to devour the carcasses of the animals which chanced to perish from fatigue. Although abundant on the open plains of this eastern portion of the continent, and likewise on the rocky and barren shores of the Pacific, nevertheless it inhabits the borders of the damp and impervious forests of Tierra del Fuego and of the broken coast of West Patagonia, even as far south as Cape Horn. The Carranchas (as the *Polyborus Brasiliensis* is called in La Plata) together with the *P. chimango*†, attend in great numbers the estancias and slaughtering houses in the neighbourhood of the Plata. If an

\* In this work, whenever the particular name of any colour is given, or it is placed within commas, it implies, that it is taken from comparison with Patrick Syme's edition of Werner's Nomenclature of Colours.

† *Milvago Chimango* of this work.



animal dies in the plain, the *Cathartes atratus* or Gallinazo commences the feast, and then these two carrion-feeding hawks pick the bones clean. Although belonging to closely allied genera, and thus commonly feeding together, they are far from being friends. When the Carrancha is quietly seated on the branch of a tree, or on the ground, the Chimango often continues flying backwards and forwards for a long time, up and down in a semicircle, trying each time, at the bottom of the curve, to strike its larger relative. The Carrancha takes little notice, except by bobbing its head. Although the Carranchas frequently assemble in numbers, they are not gregarious; for in desert places they may be seen solitary, or more commonly by pairs. Besides the carrion of large animals, these birds frequent the borders of streams and the sea-beach, for the sake of picking up whatever the waters may cast on shore. In Tierra del Fuego, and on the west coast of Patagonia, they must live almost exclusively on this last means of supply.

The Carranchas are said to be very crafty, and to steal great numbers of eggs; they attempt also, together with the Chimango, to pick the scabs off the sore backs of both horses and mules. On the one hand, the poor animal, with its ears down and its back arched; and, on the other, the hovering bird, eyeing at the distance of a yard, the disgusting morsel, form a picture which has been described by Captain Head with his own peculiar spirit and accuracy. The Carranchas kill wounded animals; but Mr. Bynoe (the surgeon of the Beagle) saw one seize in the air a live partridge, which, however, escaped, and was for some time chased on the ground. I believe this circumstance is very unusual: at all events there is no doubt that the chief part of their sustenance is derived from carrion. A person will discover their *necrophagous* habits by walking out on one of the desolate plains, and there lying down to sleep: when he awakes, he will see on each surrounding hillock, one of these birds patiently watching him with an evil eye. It is a feature in the landscape of these countries, which will be recognised by every one who has wandered over them. If a party goes out hunting with dogs and horses, it will be accompanied during the day, by several of these attendants. The uncovered craw of the Carrancha, after feeding, protrudes from its breast; at such times it is, and indeed generally, an inactive, tame, and cowardly bird. Its flight is generally heavy and slow, like that of the English carrion crow, whose place it so well supplies in America. It seldom soars; but I have twice seen one at a great height gliding through the air with much ease. It runs (in contradistinction to hopping), but not quite so quickly as some of its congeners. At times the Carrancha is noisy, but is not generally so; its cry is loud, very harsh and peculiar, and may be compared to the sound of the Spanish guttural *g*, followed by a rough double *rr*. Perhaps the Spaniards of Buenos Ayres, from this cause, have called it Carrancha. Molina, who says it is called Tharu in Chile, states, that when uttering this cry, it elevates its head

higher and higher, till at last, with its beak wide open, the crown almost touches the lower part of the back. This fact, which has been doubted, is true; for I have myself several times seen them with their heads backwards, in a completely inverted position. The Carrancha builds a large coarse nest, either in a low cliff, or in a bush or lofty tree. To these observations I may add, on the high authority of Azara, whose statements have lately been so fully confirmed by M. D'Orbigny, that the Carrancha feeds on worms, shells, slugs, grasshoppers, and frogs; that it destroys young lambs by tearing the umbilical cord: and that it pursues the Gallinazos and gulls which attend the slaughtering-houses, till these birds are compelled to vomit up any carrion they may have lately gorged. Lastly, Azara states that several Carranchas, five or six together, will unite in chase of large birds, even such as herons. All these facts show that it is a bird of very versatile habits and considerable ingenuity.

I am led to suppose that the young birds of this species sometimes congregate together. On the plains of Santa Cruz (lat. 50° S. in Patagonia), I saw in the month of April, or early autumn, between twenty and thirty Polybori, which I at first thought would form a species distinct from *P. Brasiliensis*. Amongst those I killed, there were some of both sexes; but the ovarium in the hens was only slightly granular. The plumage of the different individuals was nearly similar; and in none appeared like that of an adult bird, although certainly not of a very young one. Having mentioned these circumstances to Mr. Gould, he likewise suspected it would form a new species; but the differences appear so trifling between it and the specimens of young birds in the British Museum and in the Museum of the Zoological Society, and likewise of the figure of a young bird given by Spix, (*Avium Species Novæ*, vol. i. p. 3.), that I have thought it advisable merely to allude to the circumstance. In my specimen, which is a cock, the head, instead of being of a dark brown, which is the usual character of even very immature birds, is of a pale rusty brown. The bill and cere are less produced than in the adult *P. Brasiliensis*; and the cere is of a brighter colour, than what appears to be usual in the young of this species. In other respects there is such a perfect similarity between them, that I do not hesitate to consider my specimen as a young bird of the *P. Brasiliensis* in one of its states of change;—and to be subject to great variation of plumage during growth, is known to be a character common to the birds of this sub-family. It may, however, possibly be some variety of the *P. Brasiliensis*, for this bird seems subject to variation: Azara (*Voyage dans l'Amérique Méridionale*, vol. iii. p. 35.) remarks, “Il y a des individus dont les teintes sont plus faibles, ou d'un brun pâle, avec des taches sur la poitrine, et d'autres qui ont des couleurs plus foncées; j'ai décrit ceux qui tiennent le milieu entre les uns et les autres.”

I have myself more than once observed a single very pale-coloured bird, in



form like the *P. Brasiliensis*, mingled with the other carrion-feeding hawks on the banks of the Plata; and there is now in the British Museum a specimen, which may be considered as partly an albino. Spix, on the other hand, (*Avium Species Novæ*, p. 3.) has described some specimens from the coast of Brazil, as being remarkable from the darkness of the plumage of their wings.

#### MILVAGO, Spix.

Several new genera have lately been established to receive certain species of the sub-family of *Polyborinæ*, and consequently great confusion exists in their arrangement. Mr. George R. Gray has been kind enough to give me the following observations, by which it appears he has clearly made out, that Spix's genus *Milvago*, is that which ought to be retained. M. D'Orbigny has made two sections in the genus *Polyborus*, according as the craw is covered with feathers, or is naked, and he states that the *P. Brasiliensis* is the only species which comes within the latter division; but we shall afterwards see that the *Falco Novæ Zelandiæ*, Auct. (the *Milvago leucurus* of this work) has a naked craw, which is largely protruded after the bird has eaten. M. D'Orbigny has also instituted the genus *Phalcobænus*, to receive a bird of this sub-family, with the following characters:

"Bec fortement comprimé, sans aucune dent ni sinus, à commissure très-arquée à son extrémité; cire alongée et droite; un large espace nu entourant la partie antérieure et inférieure de l'œil, et s'étendant sur toute la mandibule inférieure; tarses emplumés sur un tiers de leur longueur, le reste réticulé; doigts longs, semblables à ceux des gallinacés, terminés par les ongles longs, déprimés et élargis, très-peu arqués, toujours à extrémité obtuse ou fortement usée; ailes de la famille, la troisième penne plus longue que les autres."

Mr. George R. Gray, however, has pointed out to me that Spix, (in his *Avium Species Novæ*) ten years since, made a division in this sub-family, from the rounded form of the nostril of one of the species, namely, the *M. ochrocephalus* of his work, or the *Chimachima* of Azara. And Mr. Gray thinks, that all the species may be grouped much more nearly in relation to their affinities by this character, than by any other: he further adds;—"The only difference which I can discover between this latter genus (*Milvago*), and D'Orbigny's (*Phalcobænus*), is, that in the latter the bill is rather longer, and not quite so elevated in the culmen as in the former; and these characters must be considered too trivial for the foundation of a generic division. I, therefore, propose to retain Spix's genus, *Milvago*, for all those *Polyborinæ* which possess rounded nostrils with

an elevated bony tubercle in the centre. They were once considered to form three distinct genera, viz.—*Milvago*, Spix. (*Polyborus*, Vieill. *Haliaëtus*, Cuv. *Aquila*, Meyen.)—*Senex*, Gray. (*Circaëtus*, Less.)—*Phalcobænus*, D'Orb. but a careful comparison of the several species, shows a regular gradation in structure from one to the other, which induces me to consider them as only forming two sections of one genus. Those which have the bill short, with the culmen arched, and are of small size, slender form, and with the tarsi rather long and slender, are—

#### 1. *Milvago ochrocephalus*, Spix.

*Polyborus chimachima*; Vieill. (young).

*Falco degener*, Licht.

*Haliaëtus chimachima*, Less.

#### 2. *Milvago pezoporos*, nob.

*Aquila pezopora*, Meyen.

#### 3. *Milvago chimango*, n.

*Polyborus chimango*, Vieill.

*Haliaëtus chimango*, Less.

Those which have a buteo-like appearance, and with rather short and stout tarsi, are,

#### 7. *Milvago leucurus*, n.

*Falco leucurus*, Forster's Drawings No. 34.

*Falco Novæ Zelandiæ*, Gm.

— *Australis*, Lath.

*Circaëtus antarcticus*, Less.

#### 8. *Milvago albogularis*, n.

*Polyborus* (*Phalcobænus*?) *albogularis*, Gould.

#### 9. *Milvago montanus*, n.

*Phalcobænus montanus*, D'Orbig.

#### 10. *Milvago megalopterus*, n.

*Aquila megaloptera*, Meyen.

#### 1. MILVAGO PEZOPOROS.

*Aquila pezopora*, Meyen. Nov. Act. Phys. Med. Acad. Cæs. Leo. Car. Nat. Cur. suppl. 1834. p. 62. pl. VI.

I obtained two specimens of this bird, one from Port Desire, in Patagonia, and another at the extreme southern point of Tierra del Fuego. Meyen\* describes it as common on the plains of Chile, and on the mountains to an elevation of 4000 or 5000 feet. As M. D'Orbigny does not notice this species, I presume it is not found on the Atlantic side of the continent, so far north as the Rio Negro, where he resided for some time. The habits and general appearance of *M. chimango* and this bird are so entirely similar, that

\* *Novorum Actorum Academiae Cæsariæ*, Leop. vol. xvi. p. 62. *Observationes Zoologicas*, F. J. Meyenii.



I did not perceive that the species were different; hence I cannot speak with certainty of their range, but it would appear probable that the *M. pezoporus* replaces in Chile, Tierra del Fuego and Southern Patagonia the *M. chimango* of La Plata. In the same manner the *M. chimango* is replaced between the latitudes of Buenos Ayres and Corrientes by a third closely allied species, the *M. ochrocephalus*. D'Orbigny, (p. 614, in the Zoological part of his work) speaking of the Chimango, says, "Il n'est pas étonnant qu'on ait long-temps confondu cette espèce avec le *falco degener*, Illiger, (the *M. ochrocephalus*) et qu'on l'ait cru de sa famille. Il est impossible de présenter plus de rapports de forme et surtout de couleur. Nous les avons, nous-même confondus au premier abord; mais, en remarquant, ultérieurement, que le sujet que nous regardions comme le mâle ne se trouvait qu'à Corrientes, tandis qu'il y avait seulement des femelles sur les rives de la Plata, l'étude plus attentive des mœurs de ces oiseaux, et les localités respectives qu'habite chacun d'eux, ne tarda pas à nous y faire reconnaître, avec Azara, deux espèces vraiment très-distinctes; mais qui, depuis, ont encore été confondues, sous la même nom, par M. la Prince Maximilien de Neuwied.\*" I may observe that the figure given in Meyen's work, has the iris coloured bright red, instead of which it should have been brown.

## 2. MILVAGO CHIMANGO.

*Polyborus chimango*, Vieill.

*Haliaetus chimango*, Less.

*Chimango*, Azar. Voyage, vol. iii. p. 35.

My specimen was obtained at Maldonado, on the banks of the Plata. In the following short account of the habits of this bird, it must be understood that I have confounded together, the *M. chimango* and the *M. pezoporus*; but I am certain that almost every remark is applicable to both species. From what has been said under the last head, it may be inferred, that both of these allied birds have comparatively limited ranges, compared with that of the *P. Brasiliensis*. Azara says the Chimango (and he first distinguished this species from the *M. ochrocephalus*, or *M. chimachima*) is rarely found so far north as Paraguay. D'Orbigny saw the Chimango (*M. pezoporus*?) at Arica in lat. 16°, and I killed the *M. pezoporus* in the extreme southern point of America, in lat. 55° 30' south.

The Chimango, in La Plata, lives chiefly on carrion, and generally is the last bird of its tribe which leaves the skeleton, and hence it may frequently be seen standing within the ribs of a cow or horse, like a bird in a cage. The Chimango often frequents the sea-coast and the borders of lakes and swamps, where it picks up small fish. It is truly omnivorous, and will eat even bread, when thrown out

\* Tom. iii. p. 162.

of a house with other offal. I was also assured that in Chiloe, these birds (probably in this district the *M. pezoporus*) materially injure the potato crops, by stocking up the roots when first planted. In the same island, I saw them following by scores the plough, and feeding on worms and larvæ of insects. I do not believe that they kill, under any circumstances, even small birds or animals. They are more active than the Carranchas, but their flight is heavy; I never saw one soar; they are very tame; are not gregarious; commonly perch on stone walls, and not upon trees. They frequently utter a gentle, shrill scream.

## 3. MILVAGO LEUCURUS.

*Falco leucurus*, Forster's Drawings, No. 34. MS.

— *Novæ Zelandiæ*, Gm.

— *australis*, Lath.

*Circæetus antarcticus*, Less.

It will be observed in the above list of synonyms, which I have given on the authority of Mr. G. R. Gray, that this bird, although possessing well marked characters, has received several specific names. Mr. Gray's discovery of Forster's original drawing with the name *F. leucurus* written on it, I consider very fortunate, as it was indispensable that the names by which it is mentioned in most ornithological works, namely, *Falco* or *Polyborus Novæ Zelandiæ*, should be changed. There is not, I believe, the slightest reason for supposing that this bird has ever been found in New Zealand. All the specimens which of late years have been brought to England have come from the Falkland Islands, or the extreme southern portion of South America. The sub-family, moreover, to which it belongs, is exclusively American; and I do not know of any case of a land bird being common to this continent and New Zealand. The origin of this specific name, which is so singularly inappropriate, as tending to perpetuate a belief which would form a strange anomaly in the geographical distribution of these birds, may be explained by the circumstance of specimens having been first brought to Europe by the naturalists during Captain Cook's second voyage, during which New Zealand was visited, and a large collection made there. In the homeward voyage, however, Cook anchored in Christmas Sound, in Tierra del Fuego, and likewise in Staten Land: describing the latter place he says, "I have often observed the eagles and vultures sitting on the hillocks among the shags, without the latter, either young or old, being disturbed at their presence. It may be asked how these birds of prey live? I suppose on the carcasses of seals and birds, which die by various causes; and probably not few, as they are so numerous." From this description I entertain very little doubt that Cook referred to the *Cathartes aura* and *Milvago leucurus*, both of which birds inhabit these latitudes, as we shall hereafter show.



The plumage in the two sexes of this species differs in a manner unusual in the family to which it belongs. The description given in all systematic works is applicable, as I ascertained by dissection, only to the old females; namely, back and breast black, with the feathers of the neck having a white central mark following the shaft,—tectrices, with a broad white band at extremity; thighs and part of the belly rufous-red; beak “ash gray,” with cere and tarsi “Dutch orange.”

MALE of smaller size than female: dark brown; with tail, pointed feathers of shoulders and base of primaries, pale rusty brown. On the breast, that part of each feather which is nearly white in the female, is pale brown: bill black, cere white, tarsi gray. As may be inferred from this description, the female is a much more beautiful bird than the male, and all the tints, both of the dark and pale colours, are much more strongly pronounced. From this circumstance, it was long before I would believe that the sexes were as here described. But the Spaniards, who are employed in hunting wild cattle, and who (like the aboriginal inhabitants of every country) are excellent practical observers, constantly assured me that the small birds with gray legs were the males of the larger ones with legs and cere of an orange colour, and thighs with rufous plumage.

The YOUNG MALE can only be distinguished from the adult bird by its beak not being so black, or cere so white; and likewise in a trifling difference of plumage, such as in the markings of the pointed feathers about the head and neck, being more like those of the female than of the old cock. One specimen, which I obtained at the Falkland Islands, I suppose is a one-year-old female; but its organs of generation were smooth: in size larger than the male; the tail dark brown, with the tip of each feather pale colour, instead of being almost black with a white band; under tail-coverts dark brown, instead of rufous; thighs only partly rufous, and chiefly on the inner sides; feathers on breast and shoulder like those of male, with part near shaft brown; those on back of head with white, like those of adult females. Beak, lower mandible gray, upper black and gray (in the old female the whole is pale gray); the edge of cere and the soles of the feet orange, instead of the whole of the cere, tarsi, and toes being thus coloured. The circumstance of the young birds of, at least, one year and a half old, as well as of the adult males, being brown coloured, will, I believe, alone account for the singular fewness of the individuals with rufous thighs, a fact which at first much surprised me.

The *Milvago leucurus* is exceedingly numerous at the Falkland Islands, and, as an old sealer who had long frequented these seas remarked to me, this Archipelago appears to be their metropolis. I was informed, by the same authority, that they are found on the Diego Ramirez Rocks, the Il Defonso islands, and on some others, but never on the mainland of Tierra del Fuego. This statement I can corroborate to a certain degree, since I never saw one in the southern part of

Tierra del Fuego, near Cape Horn, which was twice visited during our voyage. They are not found on Georgia, or on the other antarctic islands. In many respects these hawks very closely resemble in their habits the *P. Brasiliensis*. They live on the flesh of dead animals, and on marine productions. On the Ramirez Rocks, which support no vegetation, and therefore no land-animals, their entire sustenance must depend upon the sea. At the Falkland Islands they were extraordinarily tame and fearless; and constantly haunted the neighbourhood of the houses to pick up all kinds of offal. If a hunting party in the country killed a beast, these birds immediately congregated from all quarters of the horizon; and standing on the ground in a circle, they patiently awaited for their feast to commence. After eating, their uncovered craws are largely protruded, giving to them a disgusting appearance. I mention this particularly, because M. D'Orbigny says that the *P. Brasiliensis* is the only bird of this family in which the craw is much developed. They readily attack wounded birds; one of the officers of the Beagle told me he saw a cormorant in this state fly to the shore, where several of these hawks immediately seized upon it, and hastened its death by their repeated blows. I have been told that several have been seen to wait together at the mouth of a rabbit hole, and seize on the animal as it comes out. This is acting on a principle of union, which is sufficiently remarkable in birds of prey; but which is in strict conformity with the fact stated by Azara, namely, that several Carranchas unite together in pursuit of large birds, even such as herons.

The Beagle was at the Falkland Islands only during the early autumn (March), but the officers of the Adventure, who were there in the winter, mentioned many extraordinary instances of the boldness and rapacity of these birds. The sportsmen had difficulty in preventing the wounded geese from being seized before their eyes; and often, when having cautiously looked round, they thought they had succeeded in hiding a fine bird in some crevice of the rocks, on their return, they found, when intending to pick up their game, nothing but feathers. One of these hawks pounced on a dog which was lying asleep close by a party, who were out shooting; and they repeatedly flew on board the vessel lying in the harbour, so that it was necessary to keep a good look-out to prevent the hide used about the ropes, being torn from the rigging, and the meat or game from the stern. They are very mischievous and inquisitive; and they will pick up almost anything from the ground: a large black glazed hat was carried nearly a mile, as was a pair of heavy balls, used in catching wild cattle. Mr. Usborne experienced, during the survey, a severe loss, in a small Kater's-compass, in a red morocco case, which was never recovered. These birds are, moreover quarrelsome, and extremely passionate; it was curious to behold them when, impatient, tearing up the grass with their bills from rage. They are not truly



gregarious; they do not soar, and their flight is heavy and clumsy. On the ground they run with extreme quickness, putting out one leg before the other, and stretching forward their bodies, very much like pheasants. The sealers, who have sometimes, when pressed by hunger, eaten them, say that the flesh when cooked is quite white, like that of a fowl, and very good to eat—a fact which I, as well as some others of a party from the Beagle, who, owing to a gale of wind, were left on shore in northern Patagonia, until we were very hungry, can answer for, is far from being the case with the flesh of the Carrancha, or *Polyborus Brasiliensis*. It is a strange anomaly that any of the *Falconidae* should possess such perfect powers of running as is the case with this bird, and likewise with the *Phalcobæus montanus* of D'Orbigny. It perhaps, indicates an obscure relationship with the Gallinaceous order—a relation which M. D'Orbigny suggests is still more plainly shown in the Secretary Bird, which he believes represents in Southern Africa, the *Polyborinæ* of America.

The *M. leucurus* is a noisy bird, and utters several harsh cries; of which, one is so like that of the English rook, that the sealers always call it by this name. It is a curious circumstance, as shewing how, in allied species, small details of habit accompany similar structure, that these hawks throw their heads upwards and backwards, in the same strange manner, as the Carranchas (the Tharu of Molina) have been described to do. The *M. leucurus*, builds on the rocky cliffs of the sea-coast, but (as I was informed) only on the small outlying islets, and never on the two main islands: this is an odd precaution for so fearless a bird.

#### 4. MILVAGO ALBOGULARIS.

##### PLATE I.

*Polyborus*, (*Phalcobæus*) *albobularis*, Gould, Proceedings of Zoolog. Soc. Part V. (Jan. 1837.) p. 9.

*M. Fœm. fuscescens-niger, marginibus plumarum inter scapulas fulvis; primariis secundariisque albo ad apicem notatis; gula, pectore, corporeque subtus albis; lateribus fusco sparsis; rostro livido, lineis nigris ornato; cera tarsisque flavis.*

Long. tot. 20 unc.  $\frac{1}{2}$ ; rostri,  $1\frac{5}{8}$ ; alæ,  $15\frac{3}{4}$ ; caudæ, 9; tarsi, 3.

*Description of female specimen, believed to be applicable to both sexes.*

COLOUR.—Head, back, upper wing coverts pitch black, passing into liver brown; feathers on back of neck and shoulders terminating in a yellowish-brown tip, of which tint the external portion of the primaries, and nearly the whole of the tertiaries partake. Tail liver brown, with a terminal white band nearly one inch broad; base of the tectrices white, irregularly marked with brown: upper tail coverts white. All the feathers of the wing

tipped with white, their bases irregularly barred with transverse marks of brown and white. *Under surface*.—Chin, throat, breast, belly, thighs, under tail-coverts, under lining of wings, and edge of shoulders perfectly white. On the flanks, however, there are some brown feathers irregularly interspersed; and on the lower part of the breast, most of the feathers show a most obscure margin of pale brown. Bill horn-colour. Cere and tarsi yellow.

FORM.—Cere and nostril as in the *M. Leucurus*, but the bill not quite so strong. Feathers on the sides and back of head narrow and rather stiff; those on the shoulders obtusely pointed,—which character of plumage is very general in this sub-family. Wing: fourth primary very little longer than the third or the fifth, which are equal to each other. First primary three inches shorter than the fourth or longest, and more nearly equal to the sixth than to the seventh. Extremity of wing reaching to within about an inch and a half of the tail. Tarsi reticulated, with four large scales at the base: upper part covered with plumose feathers for about three quarters of an inch below the knee; but these feathers hang down and cover nearly half of the leg. Middle toe with fifteen scales, outer ones with about nine. Claws of nearly the same degree of strength, curvature and breadth as in *Polyborus Brasiliensis*, or in *M. leucurus*, but sharper than those of the latter.

	Inch.		Inch.
Total length . . . . .	20 $\frac{1}{2}$	Hind claw measured in straight line from tip to root . . . . .	$\frac{8}{10}$
Tail . . . . .	9	Claw of middle toe, a twentieth less than that of the hind one.	
Wings when folded . . . . .	15 $\frac{3}{4}$		
From tip of beak to anterior edge of eye . . . . .	$\frac{10}{16}$		
Tarsus from soles of feet to knee joint . . . . .	3 $\frac{1}{2}$		

Habitat, Santa Cruz, 50° S. Patagonia. (*April*.)

Mr. Gould, at the time of describing this species, entertained some doubts whether it might not eventually prove to be the *Phalcobæus montanus* of D'Orbigny, in a state of change. I have carefully compared it with the description of the *P. montanus*, and certainly, with the exception of the one great difference of *M. albobularis* having a white breast, whilst that part in the *P. montanus* is black, the points of resemblance are numerous and exceedingly close. The *M. albobularis*, appears to be rather larger, and the proportional length of the wing feathers are slightly different; the cere and tarsi are not of so bright a colour; the middle toe has fifteen scales on it instead of having sixteen or seventeen. The black shades of the upper surface are pitchy, instead of having an obscure metallic gloss, and the feathers of the shoulders are terminated with brown, so as to form a collar, which is not represented in the figure of



*P. montanus*, given by M. D'Orbigny. Although the main difference between the two birds, is the colour of their breasts, yet it must be observed, that in the *M. albogularis* there is some indication of an incipient change from white to brown in the plumage of that part. But as M. D'Orbigny, who was acquainted with the young birds of the *P. montanus*, (of which he has given a figure), does not mention so remarkable a modification in its plumage, as must take place on the supposition of *M. albogularis* being an immature bird of that species; and as the geographical range of the two is so very different, I am induced to consider them distinct. Moreover, on the plains of Santa Cruz, I saw several birds, and they appeared to me similar in their colouring. The *M. albogularis* is remarkable from the confined locality which it appears to frequent. A few pair were seen during the ascent of the river Santa Cruz, (Lat. 50° S.) to the Cordillera; but not one individual was observed in any other part of Patagonia. They appeared to me to resemble, in their gait and manner of flight, the *P. Brasiliensis*; but they were rather wilder. They lived in pairs, and generally were near the river. One day I observed a couple standing with the Carranchas and *M. pezoporus*, at a short distance from the carcass of a guanaco, on which the condors had commenced an attack. These peculiarities of habit are described by M. D'Orbigny in almost the same words, as occurring with the *P. montanus*; both birds frequent desert countries; the *P. montanus*, however, haunts the great mountains of Bolivia, and this species, the open plains of Patagonia.

In the valleys north of 30° in Chile, I saw several pair, either of this species, or of the *P. montanus* of D'Orbigny, (if, as is probable, they are different) or of some third kind. From the circumstance of its not extending (as I believe) so far south even as the valley of Coquimbo, it is extremely improbable that it should be the *M. albogularis*,—an inhabitant of a plain country twenty degrees further south. On the other hand, the *P. montanus* lives at a great elevation on the mountains of Upper Peru; and therefore it is probable that it might be found in a higher latitude, but at a less elevation. M. D'Orbigny says, "Elle aime les terrains secs et dépourvus de grands végétaux, qui lui seraient inutiles; car il nous est prouvé qu'elle ne se perche pas sur les branches." In another part he adds, "Elle descend cependant quelquefois jusque près de la mer, sur la côte du Pérou, mais ce n'est que pour peu de temps, et peut-être afin d'y chercher momentanément une nourriture qui lui manque dans son séjour habituel; peut-être aussi la nature du sol l'y attire-t-elle; car elle y trouve les terrains arides qui lui sont propres."\* This is so entirely the character of the northern parts of Chile, that, it appears to me extremely probable, that the *P. montanus*, which inhabits the great mountains of Bolivia, descends, in Northern Chile, to near the shores of the Pacific; but that further

\* Voyage dans l'Amerique Meridionale Partie, Oiseaux, p. 52.

south, and on the opposite side of the Cordillera, it is replaced by an allied species,—the *M. albogularis* of Santa Cruz.

##### 5. MILVAGO MEGALOPTERUS.

*Aquila megaloptera*, *Meyen*, Nov. Act. Acad. Cæs. Suppl. 1834, p. 64. Pl. VIII.

When ascending the Despoblado, a branch of the valley of Copiapó in Northern Chile, I saw several brown-coloured hawks, which at the time appeared new to me, but of which I did not procure a specimen. These I have no doubt were the *A. megaloptera* of Meyen. In the British Museum there is a specimen, brought from Chile by Mr. Crawley. Mr. G. R. Gray suspects that this bird may eventually prove to be the young of the *Phalcobæus montanus* of D'Orbigny, and as I saw that bird (or another species having a close general resemblance with it) in the valleys of Northern Chile, although not in the immediate vicinity, this supposition is by no means improbable. Meyen's figure at first sight appears very different from that of the young of the *P. montanus*, given by M. D'Orbigny, for in the latter the feathers over nearly the whole body are more distinctly bordered with a pale rufous shade, the thighs barred with the same, and the general tint is of a much redder brown. But with the exception of these differences, which are only in degree, I can find in M. D'Orbigny's description no other distinguishing character, whilst on the other hand, there are numerous points of close resemblance between the two birds in the shadings, and even trifling marks of their plumage. Meyen, moreover, in describing the habits of his species, says, it frequents a region just below the limit of perpetual snow, and that it sometimes soars at a great height like a condor. Those which I saw had the general manners of a *Polyborus* or *Milvago*, and were flying from rock to rock amongst the mountains at a considerable elevation, but far below the snow-line. In these several respects, there is a close agreement with the habits of the *P. montanus*, as described by M. D'Orbigny. I will only add that the specimen in the British Museum appeared, independently of differences of plumage, distinct from the *M. albogularis* of Patagonia, from the thinness and greater prolongation of its beak, and the slenderness of its tarsi.



## SUB.-FAM.—BUTEONINÆ.

## CRAXIREX. Gould.

*Rostrum Buteonis sed longius; mandibulæ superioris margo rectus; versus apicem subito incurvus. Alæ elongatæ. Cera lata. Nares ferè rotundæ, apertæ. Tarsi mediocres, anticè squamis tecti. Digiti magni, fortes; ungues obtusæ.*

MR. GOULD was partly led to institute this genus from the facts communicated to him by me regarding the habits of the following species, which is found in the Galapagos Archipelago, and there supplies the place of the Polybori and Milvagine of the neighbouring continent of America. If a principle of classification founded on habits alone, were admissible, this bird, as will presently be shown, undoubtedly would be ranked with more propriety in the sub-family of Polyborinæ, than amongst the Buzzards. To the latter it is closely related in the form of its nostrils; in the kind of plumage which covers the head, breast, and shoulders; in the reticulation of the scales on its feet and tarsi, and less closely in the form of its beak. To the Polyborinæ it manifests an affinity in the great strength and length of its toes and claws, and in the bluntness of the latter; in the nakedness of the cere, in the perfectly uncovered nostrils, in the prolongation and bulk of the bill, in the straightness of the line of commissure, and in the narrow shape of the head. In these several respects, taken conjointly with its habits, this bird supplies a most interesting link in the chain of affinities, by which the true buzzards pass into the great American sub-family of carrion-feeding hawks. I am, indeed, unable to decide, whether I have judged rightly in placing this genus, as first of the Buteoninæ, instead of last of the Polyborinæ.

## CRAXIREX GALAPAGOENSIS. Gould.

## PLATE II.

Polyborus Galapagoensis. Proceedings of the Zoological Society for January, 1837, p. 9.

*C. Mas. adult. Intensè fuscus; primariis nigris; secundariorum pogoniis internis transversim albo et fusco striatis; caudæ cinerascens-fuscâ, transversim lineis angustis et numerosis intensè fuscis notatâ; rostro obscure corneo; pedibus olivaceo-flavis.*

Long. tot.  $20\frac{1}{2}$  unc.; rostri,  $1\frac{1}{2}$ ; alæ, 15; caudæ,  $8\frac{1}{2}$ ; tarsi,  $3\frac{1}{4}$ .

*Fæm. adult. fæminæ juniori ferè similis, pectore tamen fusco.*

*Fæm. juv. Capite corporeque intensè stramineis, fusco-variegatis; illo in pectore et abdomine prævalente; primariis fusco-nigris; rectricum pogoniis externè cinerascens-fuscis, internè pallide rosaceis; utrisque lineis angustis et frequentibus fuscis transversim striatis, apicibus sordide albis; rostro nigrescenti-fusco; pedibus olivaceo-flavis.*

Long. tot. 24 unc.; rostri,  $1\frac{3}{4}$ ; alæ,  $17\frac{1}{4}$ ; caudæ,  $10\frac{1}{2}$ ; tarsi,  $3\frac{1}{2}$ .

*Description of adult male.*

COLOUR.—Entire dorsal aspect umber brown: base of feathers on hind part of neck, white; base of those on back, irregularly banded with pale fulvous, and the scapulars with a distinct band of it. The inferior feathers of upper tail coverts banded in like manner to their extremities. Tail dusky clove-brown, obscurely marked with darkened transverse narrow bands. Primaries perfectly black towards their extremities, but with the outer edge of their base, gray: inner web banded and freckled with gray, brown, and white, which in the secondaries takes the form of regular bars. *Under surface*, entirely umber brown, but rather paler than the upper. Lining of wings gray, with irregular transverse brown bars: under-side of tail the same, but paler. Thighs of a rather yellower brown. Bill and cere horn colour, mottled with pale gray: tarsi yellow.

FORM.—Beak, with apex much arched, both longer and more pointed than it is in the group of the Polyborinæ. Cere naked, with few bristles; nostrils large, quite uncovered, irregularly triangular, with the angles much rounded, and situated rather above a central line between the culmen and commissure. Fourth primary longest, but third and fifth nearly equal to it; first, four inches and a half shorter than fourth, and equal to the eighth; second shorter than fifth. Extremities of wing reaching within half an inch of end of tail.



Tarsi strong, feathered for nearly a third of their length beneath the joint. Scales in narrow, undivided (with the exception in some instances of one) bands, covering the front of tarsus. Toes very strong and rather long, like those of the species of *Milvago*, and much more so than in the genus *Buteo*. Hind-toe equal in length to the inner one; but not placed quite so high on the Tarsus as in *Polyborus*. Basal joints of middle toe covered with small scales, with five large ones towards the extremity. Claws very strong, thick and long, and rather more arched, and broader than in *Polyborus Brasiliensis*; their extremities obtuse, but not in so great a degree as in some species of *Milvago*.

	Inches.
Total length from tip of bill to end of tail following curvature of body . . . . .	20½
Tail . . . . .	8½
Wing, from elbow-joint to extremity of longest primary . . . . .	15
Bill, from tip to anterior edge of eye measured in a straight line . . . . .	1½
Tarsus, from soles of feet to centre of joint . . . . .	3½
Hind claw from tip to root, measured in straight line . . . . .	1½
Claw of middle toe . . . . .	1½

*Old female.*

COLOUR.—Nearly as in young female, but with the breast dark brown.

*Young female.*

COLOUR.—Head, back of neck, back, wing coverts and tertiaries barred and mottled, both with pale umber brown (of the same tint as in the male bird) and with pale fulvous orange. On head and back of neck, each feather is of the latter colour, with a mere patch of the brown on its tip; but in the longer feathers, as in the scapulars, upper tail coverts, inner web and part of outer of the tertiaries, each is distinctly barred with the dark brown. Tail as in the old male. Primaries black as in male, with the inner webs nearly white, and marked with short transverse bars. Under surface and thighs of the same fulvous orange, but some of the feathers, especially those on the breast, are marked with small spots of umber brown on their tips. Some of the longer feathers on the flanks, on the under tail coverts, and on the linings of the wing, have irregular bars of the same.

FORM and SIZE.—Larger and more robust than the male. Total length 24 inches.

Tail ten and a half inches long, and therefore longer in proportion to the wings than in the other sex. Wings from joint to end of primaries, 17¼.

Habitat, Galapagos Archipelago, (October).

This bird is, I believe, confined to the Galapagos Archipelago, where on all the islands, it is excessively numerous. It inhabits, indifferently, either the dry sterile region near the coast, which, perhaps, is its most general resort, or the damp and wooded summits of the volcanic hills. This bird, in most of its habits and disposition, resembles the *Milvago leucurus*, or the *Falco Novæ Zelandiæ* of older authors. It is extremely tame, and frequents the neighbourhood of any building inhabited by man. When a tortoise is killed even in the midst of the woods, these birds immediately congregate in great numbers, and remain either seated on the ground, or on the branches of the stunted trees, patiently waiting to devour the intestines, and to pick the carapace clean, after the meat has been cut away. These birds will eat all kinds of offal thrown from the houses, and dead fish and marine productions cast up by the sea. They are said to kill young doves, and even chickens; and are very destructive to the little tortoises, as soon as they break through the shell. In these respects this bird shows its alliance with the buzzards. Its flight is neither elegant nor swift. On the ground it is able, like the *M. leucurus* and *Phalcobæus montanus* of D'Orbigny, to run very quickly. This habit which, as before observed, is so anomalous in the Falcons, manifests in a very striking manner the relation of this new genus with the *Polyborineæ*. It is, also, a noisy bird, and utters many different cries, one of which was so very like the shrill gentle scream of the *M. chimango*, that the officers of the "Beagle" generally called it either by this name, or from its larger size by that of *Carrancha*,—both names, however, plainly indicating its close and evident relationship with the birds of that family. The crow is feathered; and does not, I believe, protrude like that of the *P. Brasiliensis* or *M. leucurus*. It builds in trees, and the female was just beginning to lay in October. The bird of which the full figure has been given, is a young female, but of, at least, one year old. The old male-bird is of a uniform dusky plumage, and is seen behind. The adult female resembles the young of the same sex, but the breast is dark brown like that of the male. In precisely the same manner as was remarked in the case of the *M. leucurus*, these old females are present in singularly few proportional numbers. One day at James' Island, out of thirty birds, which I counted standing within a hundred yards of the tents, under which we were bivouacked, there was not a single one with the dark brown breast. From this circumstance I am led to conclude that the females of this species (as with the *M. leucurus*) acquire their full plumage late in life.



## 1. BUTEO ERYTHRONOTUS.

*Haliaëtus erythronotus*, King, in Zoological Journal, vol. iii. p. 424.  
*Buteo tricolor*, D'Orbigny.

I obtained specimens of this bird from Chiloe and the Falkland Islands, and Captain King who first described it, procured his specimens from Port Famine, Lat. 53° 38' in Tierra del Fuego. M. D'Orbigny states that it has a wide range over the provinces of La Plata, central Chile, and even Bolivia; but in this latter country, it occurs only on the mountains, at an elevation of about 12,000 feet above the sea. The same author states, that it usually frequents open and dry countries; but as we now see that it is found in the dense and humid forests of Chiloe and Tierra del Fuego, this remark is not applicable. At the Falkland Islands, it preys chiefly on the rabbits, which have run wild and abound over certain parts of the island. This bird was considered by Captain King as a *Haliaëtus*; but Mr. Gould thinks it is more properly placed with the Buzzards. Captain King gave it the appropriate specific name of *erythronotus*, and, therefore, as Mr. Gould observes, the more recent one of *tricolor*, given by M. D'Orbigny, must be passed over.

## 2. BUTEO VARIUS. Gould.

*Buteo varius*, Gould, Proceedings of the Zoological Society, Part v. 1837, p. 10.

*B. vertice corporeque supra intensè fuscis, plumis fulvo marginatis vel guttatis; primariis secundariisque cinereis, lineis numerosis fuscis transversim striatis; caudâ cinerâ, lineis angustis numerosis fuscis transversim notatâ; singulis plumis flavescenti-albo ad apicem notatis; gulâ fuliginosâ; pectore fulvo, lineâ interruptâ nigrescente a gulâ tendente circumdato; abdomine imo lateribusque stramineo et rufescenti-fusco variegatis; femoribus crissoque stramineis lineis transversalibus anfractis rufescenti-fuscis ornatis; rostro nigro; cerâ tarsisque olivaceis.*

Long. tot.  $21\frac{1}{2}$ ; *alæ*,  $16\frac{1}{2}$ ; *caudæ*, 10; *tarsi*,  $3\frac{3}{4}$ .

COLOUR.—Head and back of neck umber brown, with edges of the feathers fringed with fulvous, (or buff orange with some reddish orange) and their bases white. Shoulders brown, with the feathers more broadly edged. Back the same, with the basal part of the feathers fulvous, with transverse bars of the dark brown. Tail blueish gray, with numerous, narrow, transverse, faint black bars. Tail-coverts pale fulvous, with irregular bars of dark fulvous and brown. Wings: primaries blackish gray, obscurely barred; secondaries and tertiaries more plainly barred, and tipped with fulvous. Wing coverts, dark umber brown, largely tipped, and marked with large

spots, almost forming bars, of pale fulvous. *Under surface*.—Chin black; throat and breast ochre yellow, with a narrow dark brown line on the shafts of the feathers, which, in those on the sides of the throat and breast expands into a large oval spot. Feathers on belly reddish brown, fringed and marked at base with the ochre yellow. Lining of wings ochre yellow, with numerous transverse bars of dark brown. Under-side of tail, inner webs almost white, outer pale gray, with very obscure transverse bars. Thighs, ochre yellow, with numerous zigzag transverse bars of pale reddish brown. Bill pale blackish; iris brown; tarsi gamboge yellow.

FORM.—Fourth primary very little longer than third, and about half an inch longer than fifth. First rather shorter than seventh, and longer than eighth. Wings when folded reaching within two inches of the extremity of the tail.

	Inches.
Total length . . . . .	$21\frac{1}{2}$
Length of tail . . . . .	10
Wings when folded . . . . .	$16\frac{1}{2}$
From tip of beak to within anterior edge of nostril, measured in straight line . . . . .	$1\frac{8.5}{10.0}$
Tarsi from soles of feet to middle of knee joint . . . . .	$3\frac{3}{4}$
Middle toe, measured from basal joint to tip of claw . . . . .	$2\frac{1}{2}$

Habitat, Strait of Magellan, (*February*), and Port St. Julian in Southern Patagonia, (*January*).

## 3. BUTEO VENTRALIS. Gould.

*Buteo ventralis*, Gould, Proceedings of the Zoological Society, Part v. 1837, p. 10.

*B. vertice corporeque intensè nitide fuscis, plumis dorsalibus purpurascensibus; primariis nigris; caudâ fuscâ, lineis obscurioribus cancellatâ numerosis, ad apicem sordidè albâ; gulâ abdomine medio crissoque stramineo-albis; pectoris corporisque lateribus fasciâ abdominali femoribusque flavescanti-albis fusco notatis, notis in femoribus rufescentibus; tarsis per mediam partem anticè plumosis, rostro nigro; cerâ tarsisque flavis.*

Long. tot. 23 unc.; *alæ*,  $15\frac{1}{2}$ ; *caudæ*,  $9\frac{1}{2}$ ; *tarsi*,  $3\frac{1}{2}$ .

COLOUR.—Head, back of neck, back, and wing-coverts, umber brown. Feathers on sides of throat edged with fulvous; those on lower parts of back with their basal parts marked with large white spots, edged with fulvous, but which do not show, until the feathers are ruffled. Tail of the same dark brown as the back, with many bars of pale brown, and extreme points tipped with dirty white. Tail-coverts same brown, with the more lateral ones marked with white and fulvous. Wings: primaries black, with the inner and basal webs brownish; secondaries and tertiaries brown, with obscure traces of paler



transverse bars. *Under surface*.—Chin almost white; throat and breast very pale ochre yellow, with narrow brown lines on the shaft of the feathers, which expand into large marks on the sides of the upper part of the breast, and into regular spots on those of the belly. Lining of wing white, with brown spots on the feathers near their tips, like on those of the belly. Thighs very pale ochre yellow, with transverse bars of pale brown, appearing like inverted wedge-formed marks, with the apex on the shafts. Under tail-coverts almost white; under side of tail pale gray, with darker gray bars on the inner side of shafts. Bill blueish black, with base of lower mandible and part of upper yellowish. Tarsi pale yellow.

**FORM**.—Fourth primary very little longer than either the third or fifth, which are equal. First nearly equal to the eighth. Extremity of wing when folded reaching within two inches and a half of the end of the tail.

	In.		In.
Total length . . . . .	23	Tarsi . . . . .	3½
Wing when folded . . . . .	15½	Middle toe from joint to tip of claw . . . . .	3
Tail . . . . .	9½	From extremity of beak to within nostril . . . . .	10

Habitat, Santa Cruz, Lat. 50° S. Patagonia, (*April*.)

Mr. Gould remarks that “this species has all the characters of a true *Buteo*, and will rank as one of the finest of this well defined group. In size it rather exceeds the Common Buzzard of Europe, which in its general style of colouring it somewhat resembles.”

SUB-FAM.—FALCONINA, VIG.

FALCO FEMORALIS. *Temm.*

Falco femoralis, *Temm.* Pl. Col. 121 male; and 343 adult male.  
*Sparverius*, Av. Sp. Nov. 1. p. 18.

This specimen was shot in a small valley on the plains of Patagonia, at Port Desire, in Lat. 47° 44'. It builds its nest in low bushes, and the female was sitting on the eggs in the beginning of January. Egg, 1·8 of an inch in longer diameter, and 1·4 in shorter; surface rough with white projecting points; colour nearly uniform dirty “wood brown,” thickly freckled with rather a darker tint; general appearance, as if it had been rubbed in brown mud. M. D’Orbigny supposed that Latitude 34° was the southern limit of this species; we now find its range three hundred and thirty miles further southward. The same author states that this falcon prefers a dry open country with scattered bushes, which answers to the character of the valleys, in the plains near Port Desire.

TINNUNCULUS SPARVERIUS. *Vieill.*

Falco sparverius, *Linn. et Auct.*

I obtained specimens both from North and South Patagonia (Rio Negro and Santa Cruz), and Captain King found it at Port Famine in Tierra del Fuego. I saw it at Lima in Peru; and Mr. Macleay (*Zoological Journal*, vol. iii.) sent specimens from Cuba. According to Wilson it is common in the United States, and Richardson says its northern range is about 54°. The *Tinnunculus* therefore, ranges throughout both Americas over more than 107 degrees of latitude, or 6420 geographical miles. It is the only bird, which I saw in South America, that hovered over one particular spot, in the same stationary manner, as the common English kestrel (*Falco tinnunculus*, *Linn.*) is so frequently observed to do.

SUB-FAM.—CIRCINÆ.

1. CIRCUS MEGASPILUS. *Gould.*

Circus megaspilus, *Gould*, in Proceedings of the Zoological Society, Part V. 1837, p. 10.

*C. vertice corporeque supra intensè fuscis, lineâ stramineâ a naribus supra oculos ad occiput tendente; hoc rufescenti-fusco; primariis intensè fuscis ad basin cinereis, lineis nigris cancellatis; caudæ tectricibus albis; rectricibus intermediis cinereis, externis cinereo-stramineis, omnibus lineis latis fuscis transversim notatis, lineâ ultimâ latissimâ, apice sordidè stramineo; gulari pectoreque stramineis, fusco variegatis; corpore subtus stramineo; plumis pectoris laterumque striâ centrali fuscâ notatis; rostro nigro; cerâ tarsisque flavis.*

Long. tot. 22 unc.; rostri, 1½; alæ, 17; caudæ, 10½; tarsi, 3½.

**COLOUR**.—Head, back of throat, whole back, and wing-coverts umber brown, of a nearly uniform tint, and not very dark. Front, over the nostrils, with few fulvous bristly feathers; over the eyes, extending backward, a pale almost pure white streak, which joins an irregular band, extending across the nape of the neck, from below ear to ear, of brown feathers, edged with pale fulvous, giving a streaked appearance to that part. The wing-coverts are just tipped with dirty white. Wings: primaries of the same brown as the back, the inner ones assuming a gray tinge; these, and the basal parts of the inner webs of all, are obscurely barred; secondaries and tertiaries of a paler brown than the interscapular region. Tail grayish brown, with five well-defined bars,



about  $\frac{3}{4}$  of an inch wide, of the same brown, as the rest of the upper surface; extremities tipped with very pale dirty brown. Tail-coverts; upper ones brown, and the under ones white, with small brown spots on the shaft towards their extremities. *Under surface*.—Chin, pale fulvous, or ochre yellow. Breast, belly, thighs and under tail-coverts the same; the feathers on the lower part of the breast and on the belly have a dark brown mark along the shaft, which widens but very little towards the extremity; the brown on those on the upper part of the breast and on the throat is broader, and some of the feathers are of a darker fulvous, and as the dark brown of the back encroaches on each side, this part is much darker than the rest of the under surface. Above this, and just beneath the chin, a kind of collar is formed from ear to ear, of short feathers of a more strongly pronounced fulvous tint, with a narrow brown streak on their shafts. Lining of wings, and flanks almost white, with transverse brown bars. Under side of tail pale gray passing into fulvous, with the terminal dark brown bars seen through. Bill, horn-coloured, with some white markings towards its base; tarsi bright yellow.

FORM.—Third primary rather longer than fourth, second equal to fifth; first more nearly equal to the sixth than to the seventh. Wings reaching within an inch of the end of the tail. Feathers on thighs depend but little below the knee.

Total length . . . . .	In. 22	Tarsi . . . . .	In. $3\frac{1}{8}$
Wings folded . . . . .	17	Middle toe to end of claw . . . . .	$2\frac{3}{4}$
Tail . . . . .	$10\frac{1}{2}$	From tip of bill to nearest part of cere . . . . .	$\frac{7.5}{100}$

Habitat, Maldonado, La Plata, (*July*.)

This hawk was not uncommon on the grassy savannahs and hills in the neighbourhood of the Rio Plata. Mr. Gould remarks "that in size it fully equals the *Circus aeruginosus* of Europe, which it doubtless represents in the countries it inhabits. This species has a remarkable specific character in the lanceolate and conspicuous stripes down its breast."

## 2. CIRCUS CINERIUS. Vieill.

*Circus cinerius*, Vieill. Ency. Meth.

*Falco histrionicus*, Quoy and Gaim. Voy. autour du monde, Plate 15.

*Circus histrionicus*, Vigors, Zoological Journal, vol. iii. p. 425, note.

My specimens were obtained at the Falkland Islands, and at Concepcion in Chile. M. D'Orbigny states that it is a wild bird; but at the Falkland Islands it

was, for one of its order, very tame. The same author gives a curious account of its habits: in a different manner from other raptorial birds, when it has killed its prey, it does not fly to a neighbouring tree, but devours it on the spot. It roosts on the ground, either on the top of a sand hillock, or by the bank of a stream: it sometimes walks, instead of hopping, and when doing so, it has some resemblance in general habit to the *Milvago chimango*. It preys on small quadrupeds, molluscous animals, and even insects; and I find in my notes, that I saw one in the Falkland Islands, feeding on the carrion of a dead cow. Although in these respects this *Circus* manifests some relation in its habits with the *Polyborinae*, yet it has the elegant and soaring flight, peculiar to its family; and in form it does not depart from the typical structure. Mr. Gould remarks that "we see in this elegant bird as perfect an analogue of the *Circus cyaneus* of Europe, as in the preceding species of the *Circus aeruginosus*."

## FAMILY.—STRIGIDÆ.

### SUB-FAM.—SURNINÆ.

#### ATHENE CUNICULARIA. Bonap.

*Strix cunicularia*, Mol. Bonap. Am. Orni. I. 68. pl. 7. f. 2.

This bird, from its numbers and the striking peculiarities of its habits has been mentioned in the works of all travellers, who have crossed the Pampas. In Banda Oriental it is its own workman, and excavates its burrow on any level spot of sandy soil; but in the Pampas, or wherever the Bizcacha is found, it uses those made by that animal. During the open day, but more especially in the evening, these owls may be seen in every direction standing frequently by pairs on the hillock near their habitation. If disturbed, they either enter the hole, or, uttering a shrill harsh cry, move with a remarkably undulatory flight to a short distance, and then turning round, steadily gaze at their pursuer. Occasionally in the evening they may be heard hooting. I found in the stomachs of two which I opened the remains of mice; and I saw a small snake killed and carried away by one. It is said that reptiles are the common object of their prey during the day time. Before I was aware, from the numbers of mice caught in my traps, how vastly numerous the small rodents are in these open countries, I felt much surprise how such infinite numbers of owls could find sufficient means of support. I never saw this bird south of the Rio Negro, (Lat. 41° S.) In North America they frequent only the trans-Mississippian territories in the neighbourhood of the Rocky Mountains. The account given by Say of their habits, agrees with what



may every day be observed in the Pampas; but in the northern hemisphere they inhabit the burrows of the Marmot or Prairie dog, instead of those of the Bizcacha; and it would appear that their food is chiefly derived from insects, instead of from small quadrupeds and reptiles. Mr. Gould says he has compared my specimens from La Plata and Chile, on opposite sides of the Cordillera, with those from Mexico and the Rocky Mountains of North America, and he cannot perceive the slightest specific difference between them.

## SUB-FAM.—ULULINÆ.

## 1. OTUS GALAPAGOENSIS. Gould.

## PLATE III.

Otus (Brachyotus) Galapagoensis, Gould, in Proceedings of the Zoological Society, Part V., 1837, p. 10.

*O. fasciâ circa oculos fuliginosâ; strigâ superciliari, plumis nares tangentibus et circa angulum oris, gulâ et disci facialis margine, albis; vertice corporeque supra intensè stramineo fuscoque variegatis; primariis ad apicem intensè fuscis, ad basin stramineo fasciatis; corpore subtus stramineo, notis irregularibus fuscisque fuscis ornato; femoribus tarsisque plumosis rufescenti-stramineis; rostro unguibusque nigris.*

Long. tot.  $13\frac{1}{2}$ ; rostri, 1; alæ, 11; caudæ, 6; tarsi, 2.

COLOUR.—Facial disc; plumose feathers immediately around the eyes, nearly black, tipped with glossy fulvous; those nearer the margin are white at their base, and only slightly tipped with a darker brown. Between the eyes a band of small fulvous feathers with a central streak of dark brown, passing backward, blends into the plumage of the nape. Back of head and throat streaked with fulvous and brown, the centre of each feather being brown, and its edge fulvous. Interscapular region and the feathers of the wing, coloured in the same manner, but the fulvous part is indented on each side of the shaft in the brown, giving an obscurely barred appearance to these feathers. Primaries brown, with large rounded marks of fulvous; those on the first feather being smaller, and almost white: wing-coverts brown, and but little mottled. Tail with transverse bars of the same brown and fulvous, the latter colour much clearer and stronger on the external feathers; in the central ones, the fulvous part includes irregular markings of the dark brown. *Under surface.*—Throat and breast, with center of each feather brown, edged with fulvous; the former colour being predominant. On the belly and under tail-coverts the brown coloured marks on the shafts are narrow, but they are united to narrow transverse bars, which form at the

points of intersection marked something like arrow-heads. The fulvous tint is here predominant. Downy feathers on thighs same fulvous colour as rest of body. Bill black.

FORM.—Second primary scarcely perceptibly longer than the first, and fourth rather longer than first. Tarsi thickly clothed with short feathers to the root of the nails.

	In.		In.
Total length . . . . .	$13\frac{1}{2}$	Tarsi . . . . .	2
Wings . . . . .	11	Middle toe to root of nail . . . . .	$1\frac{1}{10}$
Tail . . . . .	6	From tip of beak to interior edge of nostril . . . . .	$\frac{6}{10}$

Habitat, James Island, Galapagos Archipelago, (October).

Mr. Gould informs me, that "this species has most of the essential characters of the common short-eared owl of Europe (*Strix brachyota*), but differs from it, and all the other members of the group, in its smaller size and darker colouring."

The lesser proportional size of the fulvous marks on the first primaries, and on the tail, and the peculiar transverse brown marks on the feathers of the belly, easily distinguish it from the common short-eared owl. The specimen described is a male bird.

## 2. OTUS PALUSTRIS. Gould.

*Strix brachyota. Lath.*

Specimens of this bird were obtained at the Falkland Islands, at Santa Cruz in Patagonia, and at Maldonado on the northern bank of the Plata. At the latter place it seemed to live in long grass, and took to flight readily in the day. At the Falkland Islands it harboured in a similar manner amongst low bushes. Mr. Gould says, "So closely do the specimens brought home by Mr. Darwin, resemble European individuals, that I can discover no specific difference, by which they may be distinguished."

We have, therefore, the same species occurring in lat.  $52^{\circ}$  S. on the coast of South America, and in the northern division of the continent, according to Richardson, even as far as the sixty-seventh degree of latitude. Jardine says it is found in the Orkney islands (lat.  $59^{\circ}$ ), and in Siberia; and that he has received specimens of it from Canton. M. D'Orbigny says it is found in the Sandwich and Marianne islands in the Pacific Ocean, and at Bengal in India. This bird, therefore, may be considered as a true cosmopolite.



## ULULA RUFIPES.

*Strix rufipes*, *King*, in *Zoological Journal*, Vol. iii. p. 426.

I obtained a specimen of this bird from a party of Fuegians in the extreme southern islands of Tierra del Fuego. Owls are not uncommon in this country, and as small birds are not plentiful, and the lesser rodents extremely scarce, it at first appears difficult to imagine on what they feed. The following fact, perhaps, explains the circumstance: Mr. Bynoe, the surgeon to the "Beagle," killed an owl in the Chonos Archipelago, where the nature of the country is very similar to that of Tierra del Fuego, and, on opening its stomach, he found it filled with the remains of large-sized crabs: I conclude, therefore, that these birds here likewise subsist chiefly on marine productions.

## SUB-FAM.—STRIGINÆ.

1. STRIX FLAMMEA. *Linn.*

I obtained a specimen of a white owl from Bahia Blanca in Northern Patagonia, and Mr. Gould remarks concerning it, that he only retains the name of *S. flammea* provisionally, until all the white owls, from various countries, shall have been subjected to a careful examination. Mr. Gould suspects, that when this is effected, the South American white owl will prove to be specifically distinct from that of Europe.

2. STRIX PUNCTATISSIMA. *G. R. Gray.*

Plate IV.

*S. supra nigricans, flavo subnebulosa, minutè albo-punctatissima, maculâ albâ ad apicem plumæ, cujusvis; subtus fulva, fasciis interruptis nigricantibus; caudâ dorso concolore, nigricanti-fasciatâ, apice albâ; disco faciali castaneo-rufo nigricanti-nebuloso circumdato, pogoniis internis albis, scapis nigris; pedibus longis, infra genu plumosis; tarso reliquo digitisque subpilosus.*

Long. tot.  $13\frac{1}{2}$ ; ala,  $9\frac{1}{4}$ ; caudæ,  $4\frac{1}{4}$ ; tarsi,  $2\frac{1}{10}$ .

COLOUR.—Head and feathers within facial disc, glossy ferruginous brown, those forming the margin of it, same coloured, with their tips dark brown. Back

of head and throat smoky brown, mottled with numerous small white dots, on the tips of the feathers. Back and wing-coverts the same, with the white spots larger and purer. Wings: primaries, same dark brown, mottled with dull chesnut red; the tip of each, with the exception of the three first, is marked with a triangular white spot, of the same kind with those over the rest of the body, but larger. Tail, transversely barred with brown and reddish fulvous, and the extreme points mottled with white. *Under surface.* Breast, belly and lining of wings, fulvous, mottled with brown;—the feathers being transversely barred with narrow brown lines. Under side of tail, pale gray, with well defined transverse bars of a darker gray. Short downy feathers on tarsi, of a brighter fulvous than the rest of the under surface.

FORM.—Third primary rather longer than second; first equal to third. Wing, exceeding the tail in length by nearly one inch and a quarter. Short feathers on the tarsus, extending about one-third of its length, below the knee. Tarsi, elongated. Toes and lower part of tarsi, with few scattered brown hairs.

	In.		In.
Total length . . . . .	$13\frac{1}{2}$	Tarsi . . . . .	$2\frac{1}{10}$
Wing . . . . .	$9\frac{1}{4}$	Tip of beak to rictus . . . . .	$1\frac{1}{2}$
Tail . . . . .	$4\frac{1}{4}$	Middle toe, from root of claw to base . . . . .	$1\frac{1}{10}$

Habitat, James Island, Galapagos Archipelago, (*October.*)

I am indebted to Mr. G. R. Gray for the description of this species, which is deposited in the British Museum. Only one specimen was obtained during our visit to the Galapagos Archipelago; and this formed part of the collection made by the direction of Captain FitzRoy.

This owl is in every respect a true *Strix*; it is fully a third less than the common species of Europe, and differs from it in many respects, especially in the darker colouring of its plumage. The colouring of the Plate is not perfectly accurate in its minuter details.



## FAMILY.—CAPRIMULGIDÆ.

## SUB-FAM.—CAPRIMULGINÆ.

## 1. CAPRIMULGUS BIFASCIATUS. Gould.

*Caprimulgus bifasciatus*, Gould, in Proceedings of the Zoological Society, February 1837, p. 22.

*C. capite nigro fusco et fulvescente ornatus; caudâ albo bifasciatâ, fasciâ terminali latâ: primâ angustâ; primariis nigrescentibus fasciâ angustâ albâ ad medium: alis spuriis maculâ albâ notatis; gutture lunulâ albâ; secundariis tectricibusque alarum maculâ fulvescente ad apicem; crisso pallidè rufescente; rostro pedibusque fuscis.*

Long. tot. unc.,  $9\frac{3}{4}$ ; *alæ*,  $6\frac{1}{2}$ ; *caudæ*, 5; *tarsi*,  $\frac{3}{4}$ .

Front and back of head gray, mottled with black and with little fulvous. The latter colour more abundant, and in larger markings in the interscapular region, and on the wing-coverts. The black markings give a somewhat streaked appearance to the back of head and interscapulars. On the back of throat the fulvous tint is so much pronounced, that a collar is formed which is continued under a white one round the breast. Wings: primaries brownish-black; four external ones, with a large white mark, forming a band, at about one-third of their length from their extremities: these white marks are edged with fulvous, and the part on the outer web of the first primary, is wholly so coloured. The other primaries are marked with reddish brown, as are the secondaries and tertiaries, the marks becoming more numerous and smaller, and the colours more mottled, nearer the back. Tail: upper tail-coverts and two central feathers of tail marked like those on the back; the black, however, forming narrow interrupted transverse bars. The pair next to these central ones have near their extremities a large white mark, but only on the inner shaft. In the three succeeding pairs, the white spot extends on both sides of the shaft, and in each pair increases somewhat in size; so that in the external pair, the white spot is merely bordered with a very narrow, faint margin, of brown and fulvous. At about half their length, all the feathers, with the exception of the central pair, have a smaller white mark, but only on the inner side of the shaft. This mark is transverse, in the form of a band, and the white blends into fulvous on the edges of the webs. Outer web of these same external feathers, are transversely barred with black and fulvous. *Under surface*.—Chin, breast, belly, and lining of wings, dirty fulvous, with numerous

narrow, irregular, transverse bars of brown. Throat with white collar, beneath which the fulvous tint is predominant, forming a kind of under collar, which is continued round the whole neck. Under tail-coverts fulvous,—tail itself appears almost black, with a great terminal white band, and a narrower one at about half its length.

Wings, an inch and a quarter shorter than the tail. Second primary, scarcely perceptibly longer than the third; the first about an eighth of an inch shorter than the second, and  $\frac{1}{8}$ ths longer than the fourth. Feathers on wing, with the outer webs, slightly excised.

	In.		In.
Total length . . . . .	$9\frac{3}{4}$	Tarsi . . . . .	$\frac{3}{4}$
Wing folded . . . . .	$6\frac{1}{2}$	From tip of beak to rictus . . . . .	1
Tail . . . . .	5	Of middle toe without the claw . . . . .	$\frac{7}{10}$

Habitat, Valparaiso Chile, (*August*).

This species frequents the mountains of central Chile. When bivouacking one night on the Bell of Quillota, at an elevation of 6000 feet above the sea, I heard a gentle, plaintive cry, which I was told was made by this bird. It is regarded with superstitious dread by many of the lower orders.

Mr. Gould observes, that "this species has a strong resemblance, at the first glance, with the *Caprimulgus Europæus*, but may be readily distinguished by its shorter wing, more lengthened tarsi, by a conspicuous white band across the base of the tail, and by all these feathers, except the two middle ones, having another white band near the tip." Mr. Gould then adds, as "I am quite undecided to which of the sub-genera this and the following species should belong, I leave them for the present in the restricted genus, *Caprimulgus*, although I certainly perceive in it many points of affinity to the group which inhabits the United States of North America."

## 2. CAPRIMULGUS PARVULUS. Gould.

*Caprimulgus parvulus*, Gould, Proceedings of the Zoological Society, February 1837, p. 22.

*C. capite intensè fusco, guttis minutis cinereis ornato; vittâ rufâ cervicem cingente; gutture scapularibusque ad marginem, secundariis ad apicem stramineis; pectore et abdomine lineis fuscis transversis; primariis nigrescentibus, tribus fasciis inæqualibus pallidè rufescentibus; caudâ fasciis pallidè fulvescentibus et fuscis ornatâ.*

Long. tot. unc.,  $7\frac{1}{2}$ ; *alæ*, 5; *caudæ*, 4; *tarsi*,  $\frac{5}{8}$ .

Crown of head gray, with black longitudinal streaks. Back of neck with a fulvous ring, which extends round the front beneath one of white, as in the *C. bifas-*



*ciatus*. Back, dull gray. Interscapulars, with the central part of each feather, black, terminating in a point; the outer part of the web being broadly fringed with a very pale fulvous, the inner with gray. Wings: primaries brown, with fulvous marks, forming three irregular transverse bars, which are scarcely visible when the wing is closed. Tail and upper tail-coverts, dull coloured, very obscurely marked with transverse bars of gray and fulvous, of different degrees of darkness. *Under surface*.—Throat white, edged with fulvous on lower side. Breast, belly, and under tail-coverts, fulvous, with numerous very narrow transverse bars of brown. The pale fulvous marks, forming interrupted bars, are more plainly seen on this than on the upper side of the tail.

Third primary, very little longer than second, and second than first. First rather longer than fourth. Extremities of wings reaching within an inch and a quarter of end of tail. End of tail more rounded than in last species.

	In.		In.
Total length . . . . .	7½	Tarsi . . . . .	⅝
Wings . . . . .	5	Middle toe, from tip of claw to joint of foot . . . . .	⅞
Tail . . . . .	4	From tip of beak to rictus . . . . .	1

Habitat, La Plata, (*September*).

This species is not uncommon on the wooded banks of the Parana, near Santa Fé. If disturbed, it rises from the ground, in the same inactive manner as the European species. I saw one alight on a rope diagonally, but not so completely in a longitudinal position as does the *C. Europæus*, nor transversely as other birds. Mr. Gould observes, that “this goatsucker is full a third less than the *Caprimulgus Europæus*, and is remarkable for the uniformity of its markings, having no distinct white bars, or marks, either on the wings or tail.”

#### FAMILY.—HIRUNDINIDÆ.

##### 1. PROGNE PURPUREA. *Boie*.

*Hirundo purpurea*, *Wils.*

My specimens were obtained at Monte Video, (November) and Bahia Blanca, 39° S. (September) how much further southward this species extends I do not know. Jardine says, that in North America it migrates during summer as far as the Great Bear Lake, in Lat. 66° N.; it is mentioned by M. Audubon, at New Orleans, 30° N., and by Mr. Swainson, at Pernambuco, in 8½° S.; we may, there-

fore, conclude that it ranges throughout both Americas, but it is not found in the Old World. Wilson describes this bird as a great favourite with the inhabitants of North America, both European and Indian, who erect boxes and other contrivances near their houses for it to build in. At Bahia Blanca, the females were beginning to lay in September, (corresponding to our March): they had excavated deep holes in a cliff of compact earth, close by the side of the larger burrows inhabited by the ground parrot of Patagonia, (*Psittacara Patagonica*.) I noticed several times a small flock of these birds, pursuing each other, in a rapid and direct course, flying low, and screaming in the manner so characteristic of the English Swift, (*Hirundo Apus*, Linn.)

##### 2. PROGNE MODESTA. *Gould*.

PLATE V.

*Hirundo concolor*, *Gould*, in Proceedings of the Zoological Society.

##### *P. nitidè cærulescenti-nigra*.

Long. tot. 6 unc; *alæ*, 5¼; *caudæ*, 2¾; *tarsi*, ½.

The upper and under surface has not so strongly a marked purple shade, as in the *P. purpurea*. The primaries and feathers of the tail, however, have a greenish gloss, perhaps slightly more metallic.

Tail not so deeply forked as in *P. purpurea*, which is owing to the two external feathers on each side not being so much prolonged and bent outward, as in that species. Nostrils of less size than in the latter, although the beaks differ but little. Claws and feet are much less strong, than might have been anticipated, even proportionally to the less dimensions of this species compared with the *P. purpurea*.

	Inches.		Inches.
Total length . . . . .	6	Tarsi . . . . .	½
Wings . . . . .	5½	Middle toe from tip of claw to joint . . . . .	⅞
Tail . . . . .	2¾		

Habitat, James Island, Galapagos Archipelago, (*October*).

*Male*.

This swallow was observed only on this one island of the group, and it was there very far from common. It frequented a bold cliff of lava overhanging the sea. Had not Mr. Gould characterized it as a distinct species, I should have considered it only as a small variety, produced by an uncongenial site, of the *Progne purpurea*. I can perceive no difference whatever from that bird,



excepting in its less size, slenderness of limbs, and less deeply forked tail; and the latter difference may perhaps be owing to youth.

1. *HIRUNDO LEUCOPYGIA*. *Licht.*

My specimens were obtained at Port Famine, in Tierra del Fuego, (*February*), and at Valparaiso, in Chile, (*August to September*). At Port Famine they build in holes in a cliff of earth. Mr. Gould says, "were it not for the bare legs of this little Martin, I should have some difficulty in discriminating between it and the one so well known as a summer visitor in our island."

2. *HIRUNDO FRONTALIS*. *Gould.*

*H. vertice, plumis auricularibus, dorso et lunulâ pectorali nitidè cæruleo viridescentibus, notâ albâ supra nares, gulâ corporeque subtus albicantibus, crisso niveo, alis caudâque fuscis viridî tinctis, rostro nigro, pedibus intensè fuscis.*

Long. tot.  $4\frac{3}{4}$  unc. *alæ*,  $4\frac{3}{4}$ ; *caudæ*, 2; *tarsi*,  $\frac{1}{2}$ .

Upper surface, with a greenish blue metallic gloss; which can faintly be perceived on the primaries and on the tail feathers. The short feathers over each nostril white, thus forming two small white marks; those over the ridge of bill pale brown, giving together the appearance of a narrow white band over the upper mandible. Entire under surface and lining of wings pure white.

Tarsi rather darker than in *H. leucopygia*.

Very slightly larger than *H. leucopygia*; upper mandible rather broader.

	Inches.		Inches.
Total length . . . . .	$4\frac{3}{4}$	Tail . . . . .	2
Wings . . . . .	$4\frac{3}{4}$	Tarsi . . . . .	$\frac{1}{2}$

Habitat, Monte Video, (*November*).

Mr. Gould says, "this species is closely allied both to the common martin, and to the last species; from the former bird, however, its bare legs at once distinguish it, while it differs from the latter in being rather larger in size, in having an obscure white mark on the forehead, at the base of the bill, and in having the metallic lustre of the upper surface deep steel green, instead of purple, which is the prevailing colour of both *Hirundo leucopygia* and *H. urbica*."

It is abundant on the northern bank of the Plata, and more common than the *H. purpurea*, which frequents the same localities. It probably replaces on the eastern side of the continent, the *H. leucopygia* of Chile.

3. *HIRUNDO CYANOLEUCA*. *Vieill.*

It is nearly allied to the two latter species, but is readily distinguished from them by the absence of the white rump. I procured specimens in September, both from Valparaiso, and from Bahia Blanca (North Patagonia). At the latter place it built in holes in the same bank of earth with *P. purpurea*.

*CYPSELUS UNICOLOR*. *Jard.*

*C. unicolor*. *Jard. et Selby*, *Illust. Ornith.* pl. 83.

I obtained a specimen of this bird from St. Jago, Cape de Verd Islands. (*September*).

It more resembled a swallow than a swift in the manner of its flight. I only saw a few of them. Insects occur so scantily over the bare and parched plains of basaltic lava, which compose the lower parts of the island of St. Jago, that it is surprising how these birds are able to find the means of subsistence.

FAMILY.—*HALCYONIDÆ*.

*HALCYON ERYTHORHYNCHA*, *Gould*, *Proc. Zool. Soc.* 1837.

*Alcedo Senegalensis* var.  $\beta$ , *Lath.*

In January, during the first visit of the Beagle to St. Jago, in the Cape de Verd Islands, these birds were numerous. But in our homeward voyage, in the beginning of September, I did not see a single individual. As Mr. Gould informs me it is an African species; it is probably only a winter visitant to this archipelago. It lives in numbers in the arid valleys in the neighbourhood of Porto Praya, where it may be generally seen perched on the branch of the castor oil plant. I opened the stomachs of several, and found them filled with the wing cases of Orthopterous insects, the constant inhabitants of all sterile countries; and in the craw of one there was part of a lizard. It is tame and solitary; its flight is not swift and direct like that of the European kingfisher. In these respects, and especially



in its abundance in dry rocky valleys where there is not a drop of water, it differs widely from the habits of the allied genus *Alcedo*; although certainly it abounded more in those valleys where streamlets occurred. This Halcyon was the only brilliantly coloured bird which I saw on the island of St. Jago.

1. *CERYLE AMERICANA*, *Boie*.

*Alcedo Americana*, *Gmel.*

This Kingfisher is common on the banks of the Parana. It frequents the borders of lakes and rivers, and sitting on the branch of a tree, or on a stone, it thence takes short flights, and dashes into the water to secure its prey. Its manner of flying is neither direct nor rapid, which character is so remarkable in the flight of the European species; but it is weak and undulatory, and resembles that of the soft-billed birds. It often arrests itself suddenly in its course, and hovers over the surface of the water, preparatory to darting on some small fish. When seated on a twig it constantly elevates and depresses its tail; and as might have been expected from its figure, it does not sit in the stiff upright position so peculiar to the European Kingfisher. Its note is not unfrequently uttered: it is low, and like the clicking together of two small stones. I was informed that it builds in trees. The internal coating of the stomach is of a fine orange colour. Mr. Gould has seen specimens of this bird from Mexico; it enjoys, therefore, a very wide range.

2. *CERYLE TORQUATA*, *Bonap.*

*Alcedo torquata*, *Gmel.*

*Ispida torquata*, *Swain.*

This bird is common in the south part of Chile, in Chiloe, the Chonos Archipelago, and on the whole west coast, as far as the extreme southern parts of Tierra del Fuego. In these countries, it almost exclusively frequents the retired bays and channels of the sea with which the land is intersected; and lives on marine productions. I opened the stomach of one, and found it full of the remains of crustaceæ, and a part of a small fish. It occurs likewise in La Plata, and is very common in Brazil, where it haunts fresh water. It is said (*Dict. Class. d'Hist. Nat.*) to occur in the West Indian islands; it has, therefore, a wider range (from the equatorial region to the neighbourhood of Cape Horn) than the *Ceryle Americana*.

FAMILY.—MUSCICAPIDÆ. *Vieill.*

SUB-FAM.—TYRANNINÆ. *Sw.*

SAUROPHAGUS SULPHURATUS. *Swains.*

*Lanius sulphuratus*, *Gmel.*

*Tyrannus magnanimus*, *Vieill.* *Ency. Meth.* p. 850.

*Tyrannus sulphuratus*, *D'Orb. et Laf.* *Mag. de Zool.* 1837, p. 42.

The habits of this bird are singular. It is very common in the open country, on the northern banks of the Plata, where it does not appear to be a bird of passage. It obtains its food in many different methods. I have frequently observed it, hunting a field, hovering over one spot like a hawk, and then proceeding on to another. When seen from a short distance, thus suspended in the air, it might very readily be mistaken for one of the rapacious order; its stoop, however, is very inferior in force and rapidity. At other times the Saurophagus haunts the neighbourhood of water, and there, remaining stationary, like a kingfisher, it catches any small fish which come near the margin. These birds not unfrequently are kept, with their wings cut, either in cages or in court-yards. They soon become tame, and are very amusing from their cunning odd manners, which were described to me, as being similar to those of the common magpie. Their flight is undulatory, for the weight of the head and bill appears too great for the body. In the evening the Saurophagus takes its stand on a bush, often by the road-side, and continually repeats, without change, a shrill and rather agreeable cry, which somewhat resembles articulate words. The Spaniards say it is like the words, "Bien te veo" (I see you well), and accordingly have given it this name.

MUSCIVORA TYRANNUS. *G. R. Gray.*

*Muscicapa Tyrannus*, *Sw.*

*Tyrannus Savana*, *Vieill.* *Bonap.* *Am. Orn.* pl. 1. f. 1.

This species belongs to Mr. Swainson's genus *Milvulus* (more properly *Milvilus*), but which name Mr. G. R. Gray has altered to *Muscivora* as the latter was proposed for *Musc. forficata* as far back as 1801, by Lacepède.

It is very common near Buenos Ayres; but I do not recollect having seen many in Banda Oriental. It sits on the bough of a tree, and very frequently on



the ombu, which is planted in front of many of the farm houses, and thence takes short flights in pursuit of insects. From the remarkable structure of its tail, the inhabitants of the country call it scissor-tail; a name very well applied from the manner in which it opens and shuts the forked feathers of its tail. Like all birds thus constructed, (of which the frigate bird offers a most striking example), it has the power of turning very shortly in its flight, at which instant it opens and shuts its tail, sometimes, as it appears, in a horizontal and sometimes in a vertical plane. When on the wing it presents in its general appearance a caricature likeness of the common house swallow (*Hirundo rustica*). The Muscivora, although unquestionably belonging to the family of Muscipidæ manifests in its habits an evident relationship with birds of the fissirostral structure.

## SUB-GEN. PYROCEPHALUS, GOULD.

MUSCICAPA. Auct.

MUSCIPETA. Cuv.

TYRANNULA. Swain.

*Rostrum capite brevius, rectum, depressum, basi setis numerosis nigris obsessum; mandibulâ superiore emarginatâ, inferiorem obtegente; naribus rotundatis patulis. Caput subcristatum. Alæ longæ; remige prima secundum tertiamque longissimas subæquales fere æquante. Tarsi mediocres, anticè scutellati; digitis lateralibus inæqualibus, exteriore longiore. Cauda mediocris quadrata.*

Mr. Gould observes, that "the males of nearly all the members of this group (which may be considered either as a distinct genus or sub-genus of Myiobius), have the crown of the head and greater part of the under surface scarlet. Four species were obtained.—*Pyrocephalus parvirostris*, (Gould), and *Muscicapa coronata*, (Auct.), may be taken as types.

## 1. PYROCEPHALUS PARVIROSTRIS. Gould.

Plate VI.

Le Churrinche, Azara. No. 177.

*P. suprà fuscus; capite et subtus nitidè puniceis; rectricibus exterioribus tectricumque et secundariorum apicibus griseo-marginatis.*

Long. tot.  $5\frac{1}{2}$  unc.; alæ,  $13\frac{1}{2}$ ; caudæ,  $2\frac{5}{8}$ ; tarsi,  $\frac{7}{8}$ ; rostr.  $\frac{6}{12}$ .

Crown of the head, crest, and all the under surface, bright scarlet; the remainder

of the plumage, deep brown; the outer tail-feathers on each side, and the edges of the secondaries and wing-coverts, margined with grey.

Habitat, La Plata, (October.)

This species differs from *Pyr. coronatus* or *Muscicapa coronata*, of authors, chiefly in its size; in other respects it is very similar. The admeasurements of the latter, for comparison (as given me by Mr. G. R. Gray), are: total length, 5 inches and 8 lines; bill, between 9 and 10 lines; wings, 3 inches and 2 lines; tail, 2 inches and 7 lines; tarsi, 7 or 8 lines.

During the summer, this bird was common both near Buenos Ayres and Maldonado; but at the latter place, I did not see one in the months of May, June, July, (winter) and therefore, no doubt it is a bird of passage, migrating southward during the summer from Brazil. The birds of this and the allied genera, correspond very closely in their habits to certain of the Sylviadæ of Europe; some of the species frequenting bushes, like the black-cap, (*Sylvia atricapilla*); others more usually the ground, as the robin (*Sylvia rubecula*) or hedge-sparrow (*Accentor modularis*). Another group (*Synallaxis*, &c.) represent those European Sylviæ, which frequent reeds.

## 2. PYROCEPHALUS OBSCURUS. Gould.

*P. lividus rufotinctus; præcipuè in fronte ventrequè.*

Long. tot.  $5\frac{9}{12}$  unc.; alæ,  $3\frac{9}{12}$ ; caudæ,  $2\frac{5}{12}$ ; tarsi,  $\frac{7}{12}$ ; rostr.  $\frac{8}{12}$ .

All the plumage chocolate-brown, tinged with red, the latter colour predominating on the forehead and lower part of the abdomen; bill and tarsi, black.

A single specimen was obtained, and it would appear to be either an immature bird or a female.

Habitat, Lima, Peru. (August.)

## 3. PYROCEPHALUS NANUS. Gould.

PLATE VII.

*P. fuscus; rectricum exteriorum marginibus omniumque et secundariorum apicibus nitidè griseo-brunneis.*

*Femina, brunnea; gutture griseo-albo; corpore subtus pallidè flavescente; pectoris laterumque plumis in medio brunneo-striatis.*

Long. tot.  $4\frac{1}{2}$  unc.; alæ,  $2\frac{9}{16}$ ; caudæ,  $2\frac{1}{2}$ ; tarsi,  $\frac{8}{12}$ ; rostri,  $\frac{8}{12}$ .

*Male.*

Crown of the head, crest, and all the under surface, scarlet; back, wings, and



tail, sooty-brown; the external margin of the outer tail feathers, and the tips of all, light greyish brown; bill and tarsi, black.

*Female.*

All the upper surface, wings, and tail, brown; throat, greyish white; the remainder of under surface, pale buff, the feathers of the chest and flanks, with an obscure fine stripe of light brown down the centre.

Habitat, Galapagos Archipelago. (*September.*)

There is nothing remarkable in the habits of this bird. It frequents both the arid and rocky districts near the coast, and the damp woods in the higher parts of several of the islands in the Galapagos Archipelago.

4. PYROCEPHALUS DUBIUS. *Gould.*

*P. minor, lividus; fronte, superciliis corporeque subtus stramineis; tectricibus stramineo marginatis.*

Long. tot.  $4\frac{1}{2}$  unc; *alæ*,  $2\frac{3}{4}$  caudæ,  $1\frac{0}{2}$ ; *tarsi*,  $\frac{7}{12}$ ; *rost.*

Forehead, stripe over the eye, and all the under surface pale buff; back of the neck and upper surface chocolate brown; greater and lesser wing coverts margined with buff.

Habitat, Galapagos Archipelago, (*September.*)

From the appearance of this bird when alive, although closely resembling *P. nanus*, I entertained no doubt that it was a distinct species. Mr. G. R. Gray informs me that there is a specimen of a male in the British Museum, which differs from the male of the precedent species, in having the upper colour of a decided brown, and the external margins of the outer tail feathers and tips of the secondaries rather reddish white; also in size as stated by Mr. Gould.

MYIOBIUS. *G. R. Gray.*

TYRANNULA. *Swains.*

Mr. Gould had adopted for the following species Mr. Swainson's generic appellation of *Tyrannula*, but Mr. G. R. Gray has pointed out, that as *Tyrannulus* was proposed and published eleven years before, namely in 1816, by Vieillot, it becomes necessary to change the former name, and therefore he proposes *Myiobius*.

1. MYIOBIUS ALBICEPS. *G. R. Gray.*

*Muscipeta albiceps.* *D'Orb. et Lafr. Mag. de Zool.* 1837, p. 47.

This bird is not uncommon in Tierra del Fuego, and along the western coast of the southern part of the continent, where the land is covered with trees; it is occasionally found near Valparaiso in central Chile; and likewise in Banda Oriental on the banks of the Plata, where the country is open, from all of which places I procured specimens. At Port Famine and in the islands of the Chonos Archipelago, it inhabits the gloomiest recesses of the great forests. It generally remains quietly seated high up amongst the tallest trees, whence it constantly repeats a very plaintive, gentle whistle, in an uniform tone. The sound can be heard at some distance, yet it is difficult to perceive from which quarter it proceeds, and from how far off; and I remained in consequence, for some time in doubt, from what bird it proceeded.

2. MYIOBIUS AURICEPS.

*Tyrannula auriceps.* *Gould, MS.*

*M. rufus; capite cristato nitidè flavo; plumarum apicibus brunneis; alis brunneis, secundariorum marginibus tectricumque apicibus rufis; caudâ pallidè brunneâ, plumarum externarum marginibus externis pallidioribus; gutture corporeque subtus pallidè flavescenti-albis; plumis singulis fasciâ centrali brunneâ.*

Long. tot.  $5\frac{3}{4}$  unc; *alæ*,  $2\frac{5}{8}$  caudæ,  $2\frac{6}{8}$  *tarsi*,  $\frac{9}{12}$  *rost.*  $\frac{7}{12}$ .

All the upper surface rufous; the basal portion of the coronal feathers yellow; tail uniform light brown, the external margin of the outer feathers lighter; wings brown, the external margin of the secondaries and the tips of the greater and lesser wing-coverts rufous; throat and all the under surface pale buffy white, each feather having a brown mark down the centre; bill brown; feet black.

Habitat, Buenos Ayres, La Plata, (*August.*)

This bird is about the size of a sparrow. It is nearly allied to *Tyrannula ferruginea* of Swainson and *M. cinnamomea* of D'Orbig. and Lafr.



## 3. MYIOBIUS PARVIROSTRIS.

Tyrannula parvirostris, Gould, MS.

*M. suprà rufobrunneus; pileo, nuchâ humerisque obscure olivaceo-brunneis; alis brunneis, primariarum et secundariarum marginibus exterius angustè tectricumque latè ferrugineis; caudâ guttureque griseo-brunneis; pectore abdomineque flavescenti brunneis.*

Long. tot.  $4\frac{1}{2}$  unc.; alæ,  $2\frac{6}{12}$ ; caudæ,  $2\frac{2}{12}$ ; tarsi,  $\frac{9}{12}$ ; rost.  $\frac{6}{12}$ .

Crown of the head, back of the neck, and shoulders, dark olive brown; back and upper tail coverts rufous brown; wings brown; the external edges of the primaries and secondaries finely, and the greater and lesser wing coverts broadly margined with ferruginous; tail uniform greyish brown; throat brownish grey; chest and abdomen sandy brown; upper mandible dark brown; under mandible yellowish brown; feet blackish brown.

Habitat, Tierra del Fuego, Chile, and La Plata.

This bird inhabits the forests of Tierra del Fuego, and as I procured specimens of it in the beginning of winter (June), it probably remains throughout the year in the extreme southern part of South America. Other specimens were procured on the banks of the Plata, and near Valparaiso in Chile; it has therefore a wide range.

## 4. MYIOBIUS MAGNIROSTRIS.

PLATE VIII.

Tyrannula magnirostris, Gould, MS.

*M. Fœm. Suprà olivaceo-brunnea; caudâ brunneâ; rectricum externarum marginibus griseo-brunneis; gutture pectoreque olivaceo griseis; abdomine caudæque tectricibus inferioribus pallidè flavis; alis saturatè brunneis, secundariis tectricibusque late griseo marginatis.*

Long. tot.  $5\frac{6}{12}$ ; alæ,  $2\frac{8}{12}$ ; caudæ,  $2\frac{6}{12}$ ; tarsi,  $\frac{11}{12}$ ; rost.  $\frac{9}{12}$ .

Crown of the head and back olive brown; tail brown; the external margins of the two outer feathers greyish brown; throat and chest olive grey; abdomen and under tail coverts very pale citron yellow; wings dark brown; secondaries, greater and lesser wing coverts broadly margined with grey; bill and feet black.

Habitat, Chatham Island, Galapagos Archipelago (October).

This bird and the *Pyrocephalus nanus*, inhabit the same island. Not very uncommon.

## GENUS.—SERPOPHAGA. Gould.

*Rostrum capite multò brevius, rectum, subdepressum; tomis rectis; mandibulâ superiore submarginatâ; naribus basalibus, lateralibus, pilis mollibus anticè versis partim tectis. Alæ breves, concavæ, remige quartâ longissimâ. Cauda longiuscula subrotundata. Tarsi mediocres squamis duris annulati; digitis parvis, postico mediano brevior, lateralibus æqualibus, exteriori cum mediano usque ad articulum priorem connatum.*

## 1. SERPOPHAGA PARULUS. Gould.

*Muscicapa parulus*, Kütitz, Mem. L'Acad. Imp. des Sci. St. Peters. 1831. 1. p. 190. Pl. 9.

*Sylvia Bloxami*, Gray's Zool. Misc. 1831. p. 11.

*Culicivora parulus*, D'Orbigny & Lafre. Mag. de Zool. 1837, p. 57.

This bird is common in central Chile, in Patagonia, and although found in Tierra del Fuego, it is not numerous there. Its specific name is very well chosen, as I saw no bird in South America whose habits approach so near to those of our tom-tits (*Parus*). It frequents bushes in dry places, actively hopping about them, and sometimes repeating a shrill cry; it often moves in small bodies of three and four together. In August I found the nest of one in a valley in the Cordillera of central Chile; it was placed in a bush and was simply constructed.

## 2. SERPOPHAGA ALBO-CORONATA. Gould.

*S. supra olivaceo-brunnea, subtus pallidè flava; pileo nigrescenti brunneo, in hoc plumarum basibus lineâque supra oculos albis; alis nigrescenti brunneis, primariis angustè olivaceo marginatis, tectricibus latè olivaceo-griseo marginatis, gutture griseo.*

Long. tot.  $4\frac{3}{12}$ ; alæ, 2; caudæ, 2; tarsi,  $\frac{8}{12}$ ; rost.  $\frac{6}{12}$ .

A stripe of white from the nostrils over each eye; crown of the head brown, the base of all the feathers pure white; back of the neck, back and upper tail coverts olive brown; wings blackish brown, the external edges of the primaries finely margined with olive, and the greater and lesser wing coverts largely tipped with olive grey; tail uniform brown; throat grey; abdomen and under tail coverts pale citron yellow; bill and feet brown.

Habitat, Maldonado, La Plata, (June).

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This bird, like the last species, generally moves in very small flocks. Its habits, I presume, are also very similar; for I state in my notes that it closely approaches to our tit-mice in general manners and appearance.

3. SERPOPHAGA NIGRICANS. *Gould.*

*Sylvia nigricans*, *Vieill.*

*Tachuris nigricans*, *D'Orb. & Lafr. Mag. de Zool.* 1837. p. 55.

*Le Petit Tachuris noirâtre*, *Azara*, No. 167.

This bird is common in the neighbourhood of Maldonado, on the banks of the Plata. It generally frequents the borders of lakes, ditches, and other moist places; but is related in its general manners with the last species. It often alights on aquatic plants, growing in the water. When seated on a twig it occasionally expands its tail like a fan.

SUB-FAM.—TITYRANÆ. (PSARIANÆ, *Sw.*)

PACHYRAMPHUS, *G. R. Gray.*

*Pachyrhynchus*, *Spix.*

1. PACHYRAMPHUS ALBESCENS.

*Pachyrhynchus albescens*, *Gould, MS.*

PLATE XIV.

*P. olivaceo-griseus*; *alis nigrescenti brunneis, albescenti marginatis*; *guttur corpore-que subtus griseo-albis*; *alarum tectricibus inferioribus pallidè sulphureis.*

Long. tot.  $5\frac{3}{12}$  unc.; *alæ*,  $2\frac{1}{12}$ ; *caudæ*,  $2\frac{6}{12}$ ; *tarsi*,  $\frac{8}{12}$ ; *rostr.*  $\frac{7}{12}$ .

Head and all the upper surface olive grey; wings blackish brown, the coverts and secondaries broadly margined with dull white; primaries narrowly margined with greyish white; tail blackish brown, the external web of the outer feather white; under surface of the shoulder pale sulphur yellow; throat and under surface greyish white; bill and feet black.

Habitat, Buenos Ayres.

The generic name of *Pachyrhynchus Spix*, is changed by Mr. G. R. Gray, to *Pachyramphus*, as the former word is used in entomology.

2. PACHYRAMPHUS MINIMUS.

*Pachyrhynchus minimus*, *Gould, MS.*

PLATE XV.

*P. rufo brunneus*; *capite guttureque brunneo-nigris*; *plumarum basibus albis*; *alis caudæque brunneis, plumis flavescenti-albo marginatis*; *colli lateribus, fasciâ pectorali hypochondriisque fulvis*; *jugulo ventreeque pallidè flavescentibus.*

Long. tot.  $3\frac{7}{12}$ ; *alæ*,  $1\frac{1}{12}$ ; *caudæ*,  $1\frac{1}{12}$ ; *tarsi*,  $\frac{8}{12}$ ; *rostr.*  $\frac{5}{12}$ .

Crown of the head, sides of the face and throat blackish brown, each feather white at the base; back of the neck black, and upper tail coverts rufous brown; wings and tail dark brown, each feather margined with sandy white; sides of the neck, under surface of the shoulder, band across the chest and flanks reddish fawn colour; lower part of the throat, and centre of the abdomen very pale buff; bill and feet blackish brown.

Habitat, Monte Video, (*November*).

SUB-FAM.—FLUVICOLINÆ, SWAIN.

ALECTURUS GUIRAYETUPA. *Vieill. Dict.*

*Muscicapa psalura*, *Temm.*, Pl. Col. t. 286 and 296.

——— *risoria*, *Vieill.*, Gal. des Ois. Pl. 131.

*Yetapa psalura*, *Less.*, Tr. d'Orn. i. p. 387.

*Le Guirayetupa*, *Azara*, No. 226.

This bird is not uncommon on the open grassy country near Maldonado on the banks of the Plata. It sits generally on the top of a thistle; from which it makes short flights and catches its prey in the air. The two long feathers in its tail appear quite useless to it. It sometimes feeds on the ground. In the stomach of one which I opened there was a spider (*Lycosa*), and some Coleoptera.

1. LICHENOPS PERSPICILLATUS. *G. R. Gray.*

*Sylvia perspicillata*, *Gmel.*

*Enanthe perspicillata*, *Vieill.*

*Ada Commersoni*, *Less.*

*Perspicilla leucoptera*, *Swains.*, Nat. Libr. x. Flyc. p. 105, Pl. 9.

*Fluviola perspicillata*, *D'Orb. & Lafr.*, Mag. de Zool. 1837, p. 59.

*Le Clignot ou Lichenops*, *Comm.*, *Sunder.*

*Le Bec d'argent*, *Azara*, No. 228.

This bird belongs to the sub genus, *Perspicilla*, of Mr. Swainson; but as Mr.



G. R. Gray has pointed out that Commerson had previously considered it the type of his genus, *Lichenops*, we have been induced to prefer the latter as the oldest name. It is common in the neighbourhood of the Plata, and across the Pampas, as far as Mendoza on the eastern foot of the Andes; it has not, however, crossed those mountains and entered Chile. It usually sits on the top of a thistle, and like our common fly-catchers (*Muscicapa grisola*), takes short flights in pursuit of insects; but does not, like that bird, return to the same twig. It feeds, also, occasionally on the turf: in the stomach of some which I opened, I found Coleopterous insects, chiefly Curculionidæ. Beak, eye-lid, and iris, beautiful primrose yellow.

## 2. LICHENOPS ERYTHROPTERUS. Gould.

### PLATE IX.

*L. supra nigrescenti-brunneus, plumis rufo-marginatis; primariis secundariisque castaneis, apicibus pogoniæque externæ dimidio apicali brunneis; gutture corporeque subtus cervinis; pectore brunneo-marginato.*

Long. tot. 6 unc.; alæ, 3; caudæ,  $2\frac{3}{8}$ ; tarsi, 1; rostri,  $\frac{9}{12}$ .

All the upper surface and tail blackish brown, each feather margined with rufous; primaries and secondaries reddish chesnut, their tips and their external webs for half their length from the tip, brown; tertiaries, greater and lesser wing-coverts dark-brown, each feather margined with reddish buff; throat, and all the under surface, fawn colour; the chest spotted with brown; base of the bill, and chiefly of the lower mandible, as well as the iris, bright yellow; eye-lid, blackish yellow; feet, dark brown.

Habitat, Banks of the Plata.

This bird is not very common. It frequents damp ground, where rushes grow, on the borders of lakes. It feeds on the ground and *walks*. It is certainly allied in many respects with the foregoing species, but in its power of walking, and in feeding on the ground, there is a marked difference in habits. As it has lately been described (Swainson's Nat. Libr. Ornith. x. p. 106.) as the female of the *L. perspicillatus*, I will here point out some of its chief distinguishing characters. Its beak is slightly more depressed, but with the ridge rather more plainly pronounced. In the *L. perspicillatus*, the upper mandible is entirely yellow, excepting the apex; in the *L. erythropterus*, it is entirely pale brown, excepting the base. The eyelid in the former is bright primrose yellow, in the latter blackish yellow. The tail of *L. erythropterus* is squarer and contains only ten feathers instead of twelve: the wing is  $\frac{4}{10}$  of an inch shorter, and the secondaries relatively to the primaries are also shorter. The red colour on the primaries represents, but does not correspond with, the white on the black feathers of *L. perspicillatus*; and the secondaries in the two birds

are quite differently marked. In *L. erythropterus*, the third, fourth, and fifth primaries are the longest, and are equal to each other; the second is only a little shorter than the third. In *L. perspicillatus* the third is rather shorter than the fourth and fifth; and the second is proportionally shorter relatively to the third, so that the outer part of the wing in this species is more pointed than in *L. erythropterus*. The hinder claw in the latter is only in an extremely small degree straighter than in the former; and this, considering that the *L. perspicillatus* is generally perched, and when on the ground, can only hop; and that the *L. erythropterus* feeds there entirely, and walks, is very remarkable.

## 1. FLUVICOLA ICTEROPHRYS. D'Orb. & Lafr. Mag. de Zool. 1837. p. 59.

*Muscicapa icterophrys*, Vieill. Encyc. Meth. p. 832.

*Le Suiriri noirâtre et jaune*, Azara, No. 183.

Specimens were found by me both at Monte Video and at Maldonado, on the banks of the Plata. I found Coleoptera in their stomachs.

## 2. FLUVICOLA IRUPERO. G. R. Gray.

*Tyrannus Irupero*, Vieill. Ency. Meth. p. 856.

*Muscicapa moesta*, Licht. Cat. p. 54.

*Muscicapa nivea*, Spix, Av. pl. 29. f. 1.

*Pepoza nivea*, D'Orb. & Lafr. Mag. de Zool. 1837. p. 62.

*Irupero*, Azara, No. 204.

This elegant bird, which is conspicuous amongst most land species by the whiteness of its plumage, is found, though not commonly, (in November) in Banda Oriental; whilst near Santa Fé, three degrees of latitude northward, it was common during the same time of year. It is rather shy, generally perches on the branches of bushes and low trees.

## 3. FLUVICOLA AZARÆ. Gould.

### PLATE X.

*F. alba; alis, caudâ caudæque tectricibus atris, his albo-marginatis; primariis flavescenti-albis, basibus apicibusque nigris; rostro pedibusque atris.*

Long. tot.  $8\frac{3}{4}$  unc.; alæ,  $4\frac{9}{12}$ ; caudæ,  $4\frac{3}{12}$ ; tarsi, 1; rost. 1.

Head, all the upper and under surface white; wings and tail black; tail coverts black margined with white; primaries broad and crossed near their extremity with sulphur white, and tipped with brown; bill and legs black.

Habitat, banks of the Plata.



This bird is very common in the neighbourhood of Maldonado, where it frequents the open grassy plains. It sits on the top of a thistle, or on a twig, and catches the greater part of its food on the wing. It is generally quiet in its movements and silent. Mr. Gould remarks, that he finds "nearly all the species of this peculiar group to differ remarkably in the structure of their wings and tail, while in all other respects they closely resemble each other both in form and habit; I have, therefore, hesitated to separate them into so many genera. I have assigned the present species to Mr. Swainson's subgenus *Fluvicola*, considering that differences in the form of one organ alone would not be sufficient grounds for the institution of a new genus among such closely allied species; the present bird evidently leads off to *Tænioptera*, a genus proposed many years since, by the Prince of Musignano for the *Pepoazas* of Azara.

"This species is closely allied to, if not identical with the *Pepoaza Dominicana* of Azara, but as there is a degree of obscurity in his description, which causes some doubt on this point, I have considered it better to pay a just tribute of respect to that zealous labourer in the field of natural science, by assigning his name to this very elegant bird."

1. *XOLMIS CORONATA*. *G. R. Gray.*

*Tyrannus coronatus*, *Viell.* Ency. Meth. p. 885.

*Muscicapa vittiger*, *Licht.* Cat. p. 54.

My specimen was obtained on the wooded banks of the Parana, near Santa Fé, in Lat. 31° S.

Boie's name of *Xolmis* is adopted by Mr. G. R. Gray, as it was proposed some five years anteriorly to that of the Prince of Musignano's.

2. *XOLMIS NENGETA*. *G. R. Gray.*

*Lanius nengeta*, *Linné*, 1. p. 135. 7.

*Tyrannus nengeta*, *Swains.* Journ. Sci. xx. p. 279.

*Fluvicola nengeta*, *Swains.* Nat. Libr. Fly-catchers, p. 102. pl. 8.

*Tyrannus pepoaza*, *Viell.* Ency. Meth. p. 855.

*Muscicapa polyglotta*, *Licht. Spix.* II. pl. 24.

*Tyrannus polyglottus*, *Cuv.*

Le *Pepoaza* proprement dit, *Azara*, No. 201.

My specimen was procured at Maldonado, north bank of La Plata, where it is not common. Its habits in many respects are like those of the *Fluvicola Azaræ*; it appears to catch its prey on the wing. Iris bright red.

3. *XOLMIS VARIEGATA*. *G. R. Gray.*

PLATE XI.

*Pepoaza variegata*, *D'Orb. & Lafr.* Mag. de Zool. 1837. p. 63. Voy. dans l'Amér. Mèr. Orn. pl. 39. f. 2.

*Tænioptera variegata*. On plate.

This bird feeds in small flocks, often mingled with the icteri, plovers, and other birds on the ground. Its manner of flight and general appearance never failed to call to my recollection our common fieldfares (*Turdus pilaris*, *Linn.*) and I may observe that its plumage (in accordance with these habits) is different from that of the rest of the genus. I opened the stomachs of some specimens killed at Maldonado, and found in them seeds and ants. At Bahia Blanca I saw these birds catching on the wing large stercorivorous Coleoptera; in this respect it follows the habits, although in most others it differs from those of the rest of its tribe. Iris rich brown.

4. *XOLMIS PYROPE*. *G. R. Gray.*

*Muscicapa pyrope*, *Küllitz.* Mem. l'Acad. Imp. des Sci. St. Peters. 1831. p. 191. pl. 10. Vögel von Chili, pl. 10. p. 19.

*Pepoaza pyrope*, *D'Orb. & Lafr.* Mag. de Zool. 1837. p. 63.

This bird is not uncommon near Port Famine in Tierra del Fuego, and along the whole western coast (at Chiloe specimens were obtained) even as far north as the desert valley of Copiapó. In the thickly wooded countries of Tierra del Fuego and Chiloe, where it is more common than further northward, it generally takes its station on the branch of a tree, on the outskirts of the forest. When thus perched, usually at some height above the ground, it sharply looks out for insects passing by, which it takes on the wing. Iris scarlet. It builds a coarse nest in bushes. Egg perfectly white, pointed oval; length one inch, breadth .76 of an inch.



GENUS.—AGRIORNIS. *Gould.*

*Tyrannus*, *Eyd. & Gerv.*  
*Pepoaza*, *D'Orb. & Laf.*

*Rostrum longitudine capitis, rectum, forte, compressum, abruptè deflexum, emarginatum; tomis rectis integris; naribus basalibus, lateralibus, rotundis, patulis; rictu pilis rigidiusculis obsesso. Alæ mediocres, remige primâ longâ, tertiâ quartâque æqualibus, longissimis. Cauda mediocris, quadrata. Tarsi longi, fortes, squamis crassis annulati; digito ungueque postico mediano brevior, lateralibus æqualibus, liberis.*

Mr. Gould observes that the members of this genus are remarkable for their robust form and for their strength and magnitude of their bills; and their habits strictly accord with their structure, as they are fierce and courageous.

The species are closely allied to those of the preceding genus.\*

1. AGRIORNIS GUTTURALIS. *Gould.*

*Tyrannus gutturalis*, *Eyd. & Gerv.* Voyage de la Fav. Ois. dans Mag. de Zool. 1836. pl. 11.

*Pepoaza gutturalis*, *D'Orb. & Laf.* Mag. de Zool. 1837. p. 64.

My specimens were obtained near Valparaiso in Chile. I saw it as far north as the valley of Copiapó. I was assured by the inhabitants that it is a very fierce bird, and that it will attack and kill the young of other birds.

2. AGRIORNIS STRIATUS. *Gould.*

*A. Fæm. intensè olivaceo-brunnea; alis caudâque fuscis, utriusque plumis marginibus apiceque pallidè brunneis; rectricum externarum pogoniâ externâ albâ; gutture facieque lateribus albis, his nigrostriatis; pectore hypochondriisque olivaceo-brunneis; ventre crissoque flavescens.*

Long. tot. 10 unc.; *alæ*,  $4\frac{9}{12}$ ; *caudæ*,  $4\frac{3}{12}$ ; *tarsi*,  $1\frac{3}{12}$ ; *rostri*,  $1\frac{2}{12}$ .

Head, and all the upper surface dark olive brown; wings and tail dark brown, each feather margined and tipped with pale brown, and the outer web of the external tail-feather, white; throat, and sides of the face, white, striated with

\* Perhaps to this genus belong *Muscicapa thamnophiloides* and *cinerea*, figured by Spix, in his Aves, pl. 26. f. 1 and 2. *G. R. Gray.*

black; breast and flanks olive brown; centre of the abdomen and under tail-coverts, buff; bill, horn colour; feet, black.

Habitat, Santa Cruz, Patagonia. (*April.*)

I am not aware of any difference in habits between this species, and the following (*A. micropterus*); and the country inhabited by it is similar. From these circumstances I am induced to suspect, that it is the same species in an immature state.

3. AGRIORNIS MICROPTERUS. *Gould.*

Plate XII.

*M. pallidè brunneus, subtus flavescens-albus; alarum caudæque plumis griseo-marginatis; gutturi albis, brunneo-marginatis.*

Long. tot.  $9\frac{2}{12}$  unc.; *alæ*,  $4\frac{1}{3}$ ; *caudæ*,  $2\frac{1}{3}$ ; *tarsi*,  $1\frac{1}{12}$ ; *rostri*,  $1\frac{1}{3}$ .

Head, all the upper surface, wings and tail, pale brown, each feather of the wings and tail margined with greyish brown; throat, white, striated with dark brown; the remainder of the under surface, buffy white; bill, dark horn colour; feet brown.

Habitat, Port Desire, and St. Julian, Patagonia. (*January.*)

These birds frequent the wild valleys in which a few thickets grow. They generally take their stand on the upper twigs. They are shy, solitary, and not numerous. Mr. G. R. Gray considers the two specimens which were obtained to be immature, and that one is a full-fledged young, and the other a nestling of the *Agr. striatus*.

4. AGRIORNIS MARITIMUS. *G. R. Gray.*

PLATE XIII.

*Pepoaza maritima*, *D'Orb. et Lefr.*, Mag. de Zool. 1837, p. 65.

*Agriornis leucurus*. *Gould's MSS.*, and on Pl. xiii.

Inhabits the coast of Patagonia. It is a scarce, shy, solitary bird, frequenting the valleys in which thickets grow, but often feeding on the ground. In the interior plains of Patagonia, on the banks of the Santa Cruz, I several times saw it chasing beetles on the wing, in a peculiar manner, half hopping and half flying; when thus employed, it spreads its tail, and the white feathers in it are displayed in a very conspicuous manner. I also met with this species in the lofty and arid valleys on the eastern side of the Cordillera of Central Chile, and likewise at Copiapó.



## FAMILY.—LANIADÆ.

## SUB-FAM.—LANIANÆ, SWAINS.

## CYCLARHIS GUIANENSIS, Swains.

C. Guianensis, Swains., Ornith. Draw. Pl. 58. ♀

Tanagra Guianensis, Gmel.

Laniagra Guyanensis, D'Orb. et Lafr.

Falcunculus Guianensis, Swains., (1837.)

Le Sourciron, Levaill. Ois. D'Afr. Pl. 76. f. 2.

My specimen was obtained at Maldonado, in the latter end of May. I did not see another during my residence there. In its stomach were Coleoptera.

## SUB-FAM.—THAMNOPHILINÆ.

## THAMNOPHILUS DOLIATUS, Vieill.

Lanius doliatus, Linné.

My specimen was obtained at Maldonado, where it is not very common. It generally frequents hedge-rows. Cry rather loud, but plaintive and agreeable. Iris, reddish orange; bill, blue, especially base of lower mandible. I observed individuals (females?) in which the black and white bands on the breast were scarcely visible, and even those on the under tail-coverts but obscurely marked.

## FAMILY.—TURDIDÆ.

## 1. TURDUS RUFIVENTER. Licht.

T. rufiventer, Licht. Cat. p. 38.

——— Vieill. Ency. Meth. p. 639?

——— Spix, Av. Sp. Nov. tom. 1. p. 70. t. lxviii.

——— D'Orb. et Lafr. Voy. de l'Amer. Mer. Av. p. 203.

Grive rousse et noirâtre, Azara, No. 79.

Turdus Chochi, Vieill. Ency. Meth. p. 639.

——— D'Orb. et Lafr. Mag. de Zool. 1835. p. 17.

T. leucomelas, Vieill. Ency. Meth. 644.

T. albiventer, Spix, Av. Sp. Nov. tom. 1. p. 70. t. lxix. f. 1. m. 2 fem.

La grive blanche et noirâtre, Azara, No. 80.

The white-bellied thrush, described under the three latter synonyms, according to M. D'Orbigny, (p. 203 of the ornithological part of his work), is the female of the *T. rufiventer*. My specimens were obtained at Maldonado and the Rio Negro, which latter place, in 41°, is its most southern limit: Spix found it near Rio de Janeiro in Brazil. It utters a note of alarm very like that of the common English thrush, (*Turdus musicus*).

## 2. TURDUS FALKLANDICUS. Quoy et Gaim.

T. Falklandicus, Quoy et Gaim. Zool. de l'Uranie, p. 104.

——— Pernetty, Hist. d'un Voy. aux Iles Malouines, II. p. 20.

——— D'Orb. &amp; Lafr., Voy. de l'Amer. Mer. Av. p. 202.

T. Magellanicus, King, Proc. Zool. Soc. (1830) p. 14.

——— D'Orb. &amp; Lafr. Mag. de Zool. 1835. p. 16.

M. D'Orbigny has pointed out that the *Turdus Magellanicus* of King is only the male bird of *Turdus Falklandicus*. I obtained specimens from the Rio Negro, Falkland Islands, Tierra del Fuego and Chiloe: I believe I saw the same species in the valleys of Northern Chile; I was informed that the thrush there lines its nest with mud, in which respect it follows the habits of species of the northern hemisphere. In the Falkland Islands it chiefly inhabits the more rocky and dryer hills. It haunts also the neighbourhood of the settlement, and very frequently may be seen within old sheds. In this respect, and generally in its habits, it resembles the English thrush (*Turdus musicus*): its cry, however, is different. It is tame, silent, and inquisitive.



1. MIMUS ORPHEUS. *G. R. Gray.*

Orpheus Calandria, *D'Orb. & Lafr. Mag. de Zool.* (1835) p. 17.—Voy. de l'Amer. Mer. Av. 206. pl. x. f. 2.

Turdus Orpheus, *Spix. Av. t. 1.* pl. 71.

Mimus saturninus, *P. Max. Beitr.* p. 658?

Orpheus modulator, *Gould*, in *Proc. of Zool. Soc.* Part IV. (1836) p. 6.

This bird is described in the Proceedings of the Zoological Society (Part IV. 1836, p. 6.) as having come from the Straits of Magellan, which undoubtedly is a mistake. It is extremely common on the banks of the Plata; but a few degrees south of it, is replaced by the *O. Patagonica* of D'Orbigny. In Banda Oriental these birds are tame and bold; they constantly frequent the neighbourhood of the country houses to pick the meat, which is generally suspended to the posts and walls. If any other small bird joins in the feast, the Calandria (as this species is usually called in La Plata) immediately chases him away. In these respects, and in its manner of sometimes catching insects, the Mimus is related in its habits with that division of the *Muscicapidæ*, which includes the genus *Xolmis*: indeed, the general colour of the plumage of *X. Nengeta* is so like that of Mimus, that it might readily be mistaken for a bird of that genus. The Calandria haunts thickets and hedge-rows, where it actively hops about, and in doing so often elevates and slightly expands its tail.

2. MIMUS PATAGONICUS. *G. R. Gray.*

Orpheus Patagonicus, *D'Orb. & Lafr. Mag. de Zool.* 1836, p. 19.—Voy. de l'Amer. Mer. Av. p. 210, pl. xi. f. 2.

I obtained specimens of this bird at the Rio Negro and at Santa Cruz in Southern Patagonia, at both of which places it is common. It is not found in Tierra del Fuego, for neither it nor the other species of the genus inhabit forests. This species has slightly different habits from the *M. Orpheus*. It is a shy bird, and frequents the plains and valleys thinly scattered with stunted and thorn-bearing trees. It does not appear to move its tail so much. Its cry, like that of the rest of the genus, is harsh, but its song is sweet. The *M. Patagonicus*, whilst seated on the highest twig of some low bush, often enlivens the dreariness of the surrounding deserts by its varying song. Molina, however, describing the song of an allied species, has greatly exaggerated its charms. It may be compared to that of the sedge-bird (*Motacilla salicaria*, Linn.), but is much more powerful, some harsh notes and some very high ones being mingled with a pleasant warbling. The song of the different mocking thrushes certainly is

superior to that of any other bird which I heard in South America; and they are almost the only ones which formally perch themselves on an elevated twig for the purpose of singing. They sing only during the spring of the year. I may here mention, as a curious instance of the fine shades of difference in habits between very closely allied species, that when I first saw the *M. Patagonicus*, I concluded from habits alone that it was different from *M. Orpheus*. But having afterwards procured a specimen of the former, and comparing the two without particular care, they appeared so very similar that I changed my opinion. Mr. Gould, however, immediately upon seeing them (and he did not then know that *M. D'Orbigny* had described them as different) pronounced that they were distinct species; a conclusion in conformity with the trifling difference of habit and geographical range, of which he was not at the time aware.

3. MIMUS THENCA. *G. R. Gray.*

Turdus Thenca. *Mol.*

Orpheus Thenca. *D'Orb. Voy. de l'Amer. Mer. Orn.* p. 209, pl. f. 3.

This species seems to be confined to the coast of the Pacific, west of the Cordillera, where it replaces the *M. Orpheus*, and *M. Patagonicus* of the Atlantic side of the continent. Its southern limit is the neighbourhood of Concepcion, (lat. 37° S.) where the country changes from thick forests to an open land. The Thenca, (which is the name of this species, in the language of the Aboriginal Indians,) is common in central and northern Chile, and is likewise found (I believe the same species) near Lima, (lat. 12°) on the coast of Peru. The habits of the Thenca are similar, as far as I could perceive, to those of the *M. Patagonicus*. I observed many individuals, which had their heads stained yellow from the pollen of some flower, into which they bury their heads, probably for the sake of the small beetles concealed there. Molina describes the nest of the Thenca, as having a long passage, but I was assured by the country people, that this nest belonged to the *Synallaxis agithaloides*, and that the Thenca makes a simple nest, built externally of small prickly branches of the mimosa.



## 4. MIMUS TRIFASCIATUS. G. R. Gray.

## PLATE XVI.

Orpheus trifasciatus. Gould, in Proc. of Zool. Soc. Part v. 1837, p. 27.

*M. vertice, nuchâ, et dorso nigrescentibus; uropygio rufo pallidè lavato; alis nigrescentibus, tectricibus notâ albescente terminali fascias tres transversas facientibus; rectricibus caudæ duabus intermediis nigrescentibus, reliquis ad apicem pallidioribus; plumis auricularibus, strigâ superciliari, gulâ, et corpore subtus albis, lateribus notis guttisque fuscis ornatis; rostro pedibusque nigris.*

Long. tot.  $10\frac{1}{2}$  unc.; rost.  $1\frac{3}{8}$ ; alæ, 5; caudæ,  $5\frac{1}{2}$ ; tarsi,  $1\frac{3}{4}$ .

The vertex, nape of the neck and the back, blackish; with the lower part of the back tinged with pale rufous; the wings blackish, with the tips of the wing coverts white, forming three transverse bands; the tail with the two intermediate feathers black, with the tips of the others much paler; the auricular feathers with a streak above the eyes, throat, and beneath the abdomen white; the flanks ornamented with fuscous marks and spots.

Habitat, Charles Island, Galapagos Archipelago. (October.)

## 5. MIMUS MELANOTIS. G. R. Gray.

## PLATE XVII.

Orpheus melanotis, Gould, in Proc. of Zool. Soc. Part v. 1837, p. 27.

*M. vertice, nuchâ, dorsoque pallidè fuscis; plumis capitis et dorsi ad medium colore saturatiore; alis intensè fuscis, singulis plumis ad marginem pallidioribus, secundariis, tectricibusque majoribus notâ albâ terminali, fascias duas transversas facientibus; caudæ rectricibus nigrescenti-fuscis ad apicem albis, loro, plumisque auricularibus nigrescenti-fuscis; laterum plumis notâ fuscâ centrali, abdomine albo; rostro pedibusque nigris.*

Long tot.  $9\frac{1}{2}$  unc.; rost.  $1\frac{1}{4}$ ; alæ,  $4\frac{1}{2}$ ; caudæ,  $4\frac{1}{2}$ ; tarsi,  $1\frac{3}{8}$ .

The vertex, nape of the neck and the back, pale brown; the feathers of the head and the back, as far as the middle, of a darker colour; the wings intensely brown, with the margins of each of the feathers paler; the secondaries and the greater wing-coverts terminated with white marks, giving the appearance of two transverse bands; the feathers of the tail blackish brown, with the tips white; the lores and the feathers of the ears blackish brown, the feathers of the sides with a central brown mark, the abdomen white; the bill and feet black.

Habitat, Chatham and James's Islands, Galapagos Archipelago. (October.)

## 6. MIMUS PARVULUS. G. R. Gray.

## PLATE XVIII.

Orpheus parvulus. Gould, in Proc. of Zool. Soc. Part v. 1837, p. 27.

*M. vertice, nuchâ caudâque intensè fuscis, hujus rectricibus ad apicem albo notatis; alis fuscis secundariis tectricibusque notâ albâ apicali fascias duas transversas facientibus; loro plumisque auricularibus nigrescentibus; gulâ, colli lateribus, pectore, et abdomine albescentibus; plumis laterum notis fuscis per medium longitudinaliter excurrentibus.*

Long. tot.  $8\frac{1}{2}$  unc.; rost. 1; alæ,  $3\frac{3}{8}$ ; caudæ,  $3\frac{3}{4}$ ; tarsi,  $1\frac{1}{4}$ .

The vertex, the nape of the neck, and the tail intensely black; with the tips of the tail feathers marked with white; the wings brown with the secondaries and coverts tipped with white marks, giving the appearance of two transverse bands; the lores and the feathers of the ears black; the throat, the sides of the neck, breast, and the abdomen white; the flanks marked longitudinally with brown.

Habitat, Albemarle Island, Galapagos Archipelago. (October.)

It will be seen, that the three last species of the genus *Mimus*, were procured from the Galapagos Archipelago; and as there is a fact, connected with their geographical distribution, which appears to me of the highest interest, I have had these three figured. There are five large islands in this Archipelago, and several smaller ones. I fortunately happened to observe, that the specimens which I collected in the two first islands we visited, differed from each other, and this made me pay particular attention to their collection. I found that all in Charles Island belonged to *M. trifasciatus*; all in Albemarle Island to *M. parvulus*, and all in Chatham and James's Islands to *M. melanotis*. I do not rest this fact solely on my own observation, but several specimens were brought home in the Beagle, and they were found, according to their species, to have come from the islands as above named. Charles Island is distant fifty miles from Chatham Island, and thirty-two from Albemarle Island. This latter is only ten miles from James Island, yet the many specimens procured from both belonged respectively to different species. James and Chatham, which possess the same species, are seventy miles apart, but Indefatigable Island is situated between them, which perhaps, has afforded a means of communication. The fact, that islands in sight of each other, should thus possess peculiar species, would be scarcely credible, if it were not supported by some others of an analogous nature, which I have mentioned in my Journal of the Voyage of the Beagle. I may observe, that as some naturalists may be inclined to attribute these differences to local varieties; that if birds so different as *O. trifasciatus*, and



*O. parvulus*, can be considered as varieties of one species, then the experience of all the best ornithologists must be given up, and whole genera must be blended into one species. I cannot myself doubt that *M. trifasciatus*, and *M. parvulus* are as distinct species as any that can be named in one restricted genus.

The habits of these three species are similar, and they evidently replace each other in the natural economy of the different islands; nor can I point out any difference between their habits and those of *M. Thenca* of Chile; I imagined, however, that the tone of their voice was slightly different. They are lively, inquisitive, active birds, and run fast; (I cannot assert, positively, that *M. Thenca runs*). They are so extremely tame, a character in common with the other birds of this Archipelago, that one alighted on a cup of water which I held in my hand, and drank out of it. They sing pleasantly; their nest is said to be simple and open. They seem to prefer the dry sterile regions nearer the coast, but they are likewise found in the higher, damper and more fertile parts of the islands. To these latter situations, however, they seem chiefly attracted by the houses and cleared ground of the colonists. I repeatedly saw the *M. melanotis* at James Island, tearing bits of meat from the flesh of the tortoise, which was cut into strips and suspended to dry, precisely in the same manner as I have so often observed the *M. Orpheus*, in La Plata, attacking the meat hung up near the Estancias.

#### 1. FURNARIUS RUFUS. Vieill.

*Furnarius rufus*, Vieill., Ency. Meth. 513.

*Merops rufus*, Gmel. Pl. enl. 739.

*Opetiorhynchus rufus*, Tem. Man.

*Turdus vadius*, Licht. Cat.

*Figulus albogularis*, Spix. Av. pl. lxxviii. f. 1 & 2.

Fournier, Buff., Azara, No. 221.

This bird is common in Banda Oriental, on the banks of the Plata; but I did not see it further southward. It is called by the Spaniards Casaro, or house-builder, from the very singular nest which it constructs. The most exposed situation, as on the top of a post, the stem of an opuntia, or bare rock, is chosen. The nest consists of mud and bits of straw; it is very strong, and the sides are thick; in shape it resembles a depressed beehive or oven, and hence the name of the genus. Directly in front of the mouth of the nest, which is large and arched, there is a partition, which reaches nearly to the roof, thus forming a passage or ante-chamber to the true nest. At Maldonado, in the end of May, the bird was busy in building. The *Furnarius* is very common in Banda Oriental; it often haunts the bushes in the neighbourhood of houses; it is an active bird, and both walks and runs quickly, and generally by starts; it feeds chiefly on Coleoptera; it often utters a peculiar, loud, shrill, and quickly reiterated cry.

#### 2. FURNARIUS CUNICULARIUS. G. R. Gray.

*Alanda cunicularia*, Vieill.

*Alanda fissirostra*, Kittl. Mem. l'Acad. St. Peters. ii. pl. 3.

*Certhilanda cunicularia*, D'Orb. & Lafr. Mag. de Zool.

This bird has a considerable geographical range. On the eastern side of the continent it is found from about 40° (for I never saw one in the southern districts of Patagonia) northward to at least 30°, and perhaps much further. On the western side its southern limit is the neighbourhood of Concepcion, where the country becomes dry and open, and it ranges throughout Chile (specimens were procured from Valparaiso) to at least as far north as Lima, in lat. 12°, on the coast of Peru. I may here observe, that the northern limit of all birds, which are lovers of dry countries, such as this *Furnarius* and some of the species of *Mimus*, is not probably at Lima but near Cape Blanco, 10° south of the Equator, where the open and parched land of Peru blends (as it was described to me) rather suddenly into the magnificent forests of Guayaquil. This *Furnarius* constantly haunts the driest and most open districts; and hence sand-dunes near the coast afford it a favourite resort. In La Plata, in Northern Patagonia, and in Central Chile, it is abundant: in the former country it is called Casarita, a name which has evidently been given from its relationship with the Casaro, or *Furnarius rufus*, for, as we shall see, its nidification is very different. It is a very tame, most quiet, solitary little bird, and like the English robin (*Sylvia rubecula*) it is usually most active early in the morning and late in the evening. When disturbed it flies only to a short distance; it is fond of dusting itself on the roads; it walks and runs (but not very quickly), and generally by starts. I opened the stomachs of some, and found in them remains of Coleoptera, and chiefly Carabidæ. At certain seasons it frequently utters a peculiar, shrill but gentle, reiterated cry, which is so quickly repeated as to produce one running sound. In this respect, and in its manner of walking on the ground, and in its food, this species closely resembles the Casaro, but in its quiet manners it differs widely from that active bird. Its nidification is likewise different, for it builds its nest at the bottom of a narrow cylindrical hole, which is said to extend horizontally to nearly six feet under ground. Several of the country people told me, that when boys, they had attempted to dig out the nest, but had scarcely ever succeeded in getting to the end. The bird chooses any low bank of firm sandy soil by the side of a road or stream. At the settlement of Bahia Blanca the walls are built of hardened mud; and I noticed one, enclosing a courtyard, where I lodged, which was penetrated by round holes in a score of places. On asking the owner the cause of this, he bitterly complained of the little Casarita, several



of which I afterwards observed at work. It is rather curious, that as these birds were constantly flitting backwards and forwards over the low wall, they must be quite incapable of judging of distance or thickness even after the shortest circuitous route, for otherwise they would not have made so many vain attempts.

UPPUCERTHIA DUMETORIA. *I. Geoffr. & D'Orb.*

PLATE XIX.

Uppucertbia dumetoria, *J. Geoffr. & D'Orb.* Ann. du Mus. i. 393 and 394.

Furnarius dumetorum, *D'Orb.* MS.

Uppucertbia dumetorum, *D'Orb. & Lafr.* Mag. de Zool. 1838, p. 20.

This bird is an inhabitant of extremely sterile regions. I saw several at the Rio Negro, but at Port Desire they were, perhaps, more numerous. I did not observe it near Valparaiso, in Central Chile, but I procured specimens of it from Coquimbo, where the country is more desert. It frequents open places, in which a few bushes grow. It hops very quickly, and often flies quietly from one place to another. It may often be seen turning over and picking dry pieces of dung. It is a remarkable circumstance, that in the three specimens which I brought home, from different localities, namely the Rio Negro, Port Desire, and Coquimbo, the beak varies considerably in length: in that from Port Desire in Patagonia it is three-eighths of an inch shorter than in that from Coquimbo in Chile; whilst the Rio Negro specimen is intermediate between them. Mr. G. R. Gray has pointed out to me that Latham long since observed a great variation in the beak of the Patagonian warbler, *Opetiorhynchus Patagonicus*.

1. OPETIORHYNCHUS VULGARIS. *G. R. Gray.*

Uppucertbia vulgaris, *D'Orbig. & Lafr.* Mag. de Zool. 1838, p. 23.

This bird in general habits has several points of resemblance with the *Furnarius cunicularius*, but differs in some other respects. Its flight is somewhat similar, but it shows two red bands on its wings, instead of one, by which it can be distinguished at a distance: instead of walking it only hops; it feeds entirely on the ground, and in its stomach I found scarcely anything but Coleopterous insects, and of these many were fungi feeders. It often frequents the borders of lakes, where the water has thrown up leaves and other refuse. It likewise may be met with in all parts of the open grassy plains of Banda Oriental, where (like the *Uppucertbia* at the Rio Negro) it often turns over dry dung. Its note is very like that of the *F. cunicularius*, but more acute, and consists of a shrill cry, quickly reiterated so as to make a running sound. I was informed that, like that bird, it builds its nest at the bottom of a deep burrow. This species

is common in La Plata, the Falkland Islands, and Tierra del Fuego; in the latter it frequents the higher parts of the mountains, or those exposed to the western gales, which are free from forests, for it is a bird that exclusively lives in open countries and on the ground. I believe it is not found in Chile; nor is it common on the coast of Patagonia. This species in its habits is very different from the three following closely allied ones, since the latter never, or most rarely, leave the sea beach, whilst this bird, excepting by chance, is never seen there, but always in the interior country. Nevertheless with this marked difference in habits, (there are several other points beside that of the station frequented), if the preserved skins of *O. parvulus* and *O. vulgaris* were placed in the hands of any one, even perhaps of a practised ornithologist, he would at first hesitate to consider them distinct, although upon closer examination he would find many points of difference,—of which the much greater strength of the feet and the greater length of the tarsus are conspicuous in those species, which live amongst the stones on the sea beach.

2. OPETIORHYNCHUS PATAGONICUS. *G. R. Gray.*

Patagonian Warbler, *Lath.* Syn. iv. p. 434.

Motacilla Patagonica, *Gmel.*

Motacilla Gracula, *Forst.* Draw. No. 160.

Sylvia Patagonica, *Lath.* Index, ii. 517.

Furnarius Lessonii, *Dumont.*

——— Chilensis, *Less.* Voy. de la Coqu. i. p. 671, n. Tr. d'Ornith. p. 307, pl. 75, f. 1.

Opetiorhynchus rupestris, *Kittl.* Mem. de l'Acad. St. Petersb. i. p. 188, pl. viii.

Uppucertbia rupestris, *D'Orb. & Lafr.* Mag. de Zool. 1838, p. 21.

This bird is extremely common on the sea shore of all the bays and channels of Tierra del Fuego; on the western coast it is replaced in Northern Chile by the *O. nigrofumosus*, and in the Falkland Islands by the *O. antarcticus*. As the habits of this species and those just named are quite similar, I shall describe them all together under the head of *O. nigrofumosus*. A specimen of *O. Patagonicus* from Chiloe has a bill rather more than two-tenths of an inch longer than in those from Tierra del Fuego; but as no other difference can be perceived, I cannot allow that this is a specific character any more than in the case of the *Uppucertbia*.

3. OPETIORHYNCHUS ANTARCTICUS. *G. R. Gray.*

Certhia antarctica, *Garn.* Ann. des Sc. Nat. 1826.

Furnarius fuliginosus, *Less.* Voy. de la Coqu. Zool. i. p. 670.

Patagonian Warbler, *Lath.* ♀ in Dixon's Voy. App. No. 1, 359 and pl.

This species inhabits the Falkland Islands. My specimens were procured at



the east island, from which, also, those described by the French naturalists came, and likewise that given in the Appendix to Dixon's Voyage. I have no doubt that it is peculiar to this group, for the foregoing species, which in the neighbouring mainland of Tierra del Fuego supplies its place and has precisely the same habits, has been examined by Mr. Gould and is considered distinct. The *O. antarcticus* has long been noticed by voyagers to the Falkland Islands from its extreme tameness: in the year 1763 Pernety states it was so tame that it would almost perch on his finger, and that in half an hour he killed ten with a wand.

4. *OPETIORHYNCHUS NIGROFUMOSUS*. *G. R. Gray.*

PLATE XX.

*Uppucerthia nigrofumosa*, *D'Orb. et Lafr.* Mag. de Zool. 1838, p. 23.

*Opetiorhynchus lanceolatus*, *Gould*, MS. and on plate XX.

My specimen was killed at Coquimbo, on the coast of Chile. It differs from *O. Patagonicus* in its larger size, much stronger feet and bill, and more dusky plumage, and in the white streak over the eye being less plainly marked. In this species the red band, which extends from the body obliquely across the wings in all the species, reaches to the third primary, whereas in *O. Patagonicus*, *O. vulgaris*, and *O. antarcticus*, that feather is not marked, or so faintly, as scarcely to be distinguishable. In the genus *Furnarius*, the wing feathers are marked in an analogous manner. I saw this species (as I believe) on the coast near the mouth of the valley of Copiapó.

I will now make a few remarks on the habits of these three coast species. The first, *O. antarcticus*, is confined, as I have every reason to believe, to the Falkland Islands. The second inhabits Tierra del Fuego, and in Chiloe and Central Chile is replaced by the local variety with a long beak, and this still further northward by the *O. nigrofumosus*. On the east side of the continent I do not believe these marine species extend so far northward. I never saw one on the shores of the Plata, but they occur in Central Patagonia. These birds live almost exclusively on the sea beach, whether formed of shingle or rock, and feed just above the surf on the matter thrown up by the waves. The pebbly beds of large rivers sometimes tempt a solitary pair to wander far from the coast. Thus at Santa Cruz I saw one at least one hundred miles inland, and I several times observed the same thing in Chile, which has likewise been remarked by Kittlitz, who has given a very faithful account of the habits of *O. Patagonicus*. I must add that I also saw this bird in the stony and arid valleys in the Cordillera, at a height of at least 8000 feet. In Tierra del Fuego I scarcely ever saw one twenty yards from the beach, and both there and at the Falkland Islands they may fre-

quently be seen walking on the buoyant leaves of the *Fucus giganteus*, at some little distance from the shore. In these respects, the birds of this genus entirely replace in habits many species of *Tringa*. In the stomachs of those I opened I found small crabs and little shells, and one *Buccinum* even a quarter of an inch long: Kittlitz says, he found in one, besides such objects, some small seeds. They are very quiet, tame and solitary, but they may not unfrequently be seen in pairs. They hop and likewise *run* quickly; in which latter respect, and likewise in their greater tameness, they differ from the *O. vulgaris*. Their cry is seldom uttered, but is a quick repetition of a shrill note, like that of the last named bird, and of several species of *Furnarius*.

On the 20th of September, I found, near Valparaiso, the nest of *O. Patagonicus*, with young birds in it: it was placed in a small hole in the roof of a deep cavern, not far from the bank of a pebbly stream. Three months later in the summer I found, in the Chonos Archipelago (Lat. 45°), a nest of this species, placed in a small hole beneath an old tree, close to the sea-beach. The nest was composed of coarse grass and was untidily built. The egg rather elongated; length 1.11 of an inch, width in broadest part .8 of an inch; perfectly white.

GENUS.—*EREMOBIUS*. *Gould.*

Rostrum capitis longitudine seu longius, fere rectum, ad apicem deorsum curvatum, haud emarginatum; naribus parvis, basalibus, oblongis, in sulco positis; Alæ breves, remigibus primariis secundariisque fere æqualibus, plumis 4, 5, 6-que subæqualibus longissimisque; Cauda mediocris apice rotundato; Tarsi sublongi antice squamis fere obsoletis induti, hallucis digito medio brevior, digitis lateralibus inæqualibus, internis brevioribus.

*EREMOBIUS PHENICURUS*. *Gould.*

PLATE XXI.

*E. fuscus*, remigibus cinereo fusco marginatis, striâ superciliari pone oculos extensâ cinereo-albâ; caudâ nigro-fuscâ basi castaneo fuscâ; gulâ abdomineque medio cinereo albis; hypochondriis tectricibusque caudalibus inferioribus pallide flavescens.

Long. tot.  $6\frac{3}{12}$  unc.; rostr. 1; alæ,  $2\frac{3}{12}$ ; caudæ, 3; tarsi,  $\frac{9}{12}$ .

Head and all the upper surface brown; the primaries margined with greyish brown; stripe over and behind the eye greyish white; tail feathers chestnut brown at the base, and blackish brown for the remainder of their length;



throat and centre of the abdomen greyish white, passing into pale buff on the flanks and under tail-coverts; bill and feet blackish brown.

Habitat, Patagonia.

This bird, though forming a well-marked genus, is in many respects, even in plumage, allied to *Furnarius* and *Opetiorhynchus*,—for instance, in the streak over its eyes, in the red band on its wings extending obliquely from the body to the third primary, and to some of the species of these genera in its rather plumose feathers. In its general manners, the same resemblance, together with some differences, always struck me. It lives entirely on the ground, and generally in dry sterile situations, where it haunts the scattered thickets, and often flies from one to another. When skulking about the bushes it cocks up its tail, imitating in this respect *Pterotochos* and *Rhinomya*. Its cry is shrill, quickly reiterated, and very similar to that of several species of *Furnarius* and *Opetiorhynchus*. The stomach of one which I opened was full of *Coleoptera*. I procured specimens from three places on the coast of Patagonia; namely, Port Desire, St. Julian, and Santa Cruz; but it is nowhere common. I likewise saw it at a considerable elevation in the eastern valleys of the barren Cordillera, near Mendoza.

*RHINOMYA LANCEOLATA.* *Is. Geoffr. & D'Orb.*

*Rhinomya lanceolata.* *Is. Geoffr. & D'Orb.* Voy. de l'Amer. Mer. pl. 7. f. 1. 1832, cl. 11. pl. 3. id.—Mag. de Zool. 1832, 11. pl. 3. and 1837, p. 15.

I procured a specimen of this bird from the Rio Negro in Northern Patagonia, and I never saw one any where else; and M. D'Orbigny makes the same remark. On the Atlantic side of the continent, it replaces the several species of *Pterotochos* which live on the shores of the Pacific. Its habits, in some respects, are similar; it lives at the bottom of hedges or thickets, where it runs with such quickness, that it might easily be mistaken for a rat. It is very unwilling to take flight, so that, I was assured by some of the inhabitants, that it could not fly, which, however, is a mistake. It frequently utters a loud and very singular cry. The *Rhinomya* is distantly allied to the *Eremobius phœnicurus*, which is found in Southern Patagonia, whose habits in some respects are similar.

1. *PTEROPTOCHOS TARNII.* *G. R. Gray.*

*Hylactes Tarnii.* *Vigors*, Proc. Zool. 1830.

*Megalonyx ruficeps.* *D'Orb. & Lafr.* Mag. de Zool. 1837, p. 15.

*Leptonyx Tarnii.* *D'Orb. & Lafr.* Voy. de l'Amer. Mer. Av. p. 198, pl. viii. f. 1.

This species, as well as several others of the genus, and likewise of *Scytalopus* are confined to the west coast of South America. The *P. Tarnii* ranges from the

neighbourhood of Concepcion, lat. 37°, to south of the Peninsula of Tres Montes, between 41° and 50°. It is not found in Tierra del Fuego, where the climate probably is too cold for it, for in other respects, the great forests of that country appear admirably adapted to its habits. Its limit, northward of the province of Concepcion, is evidently due to the change which there takes place, from dense forests to an open and dry country. The *P. Tarnii* is abundant in all parts of the Island of Chiloe, where it is called by the native Indians, *guid-guid*; but by the English sailors, the barking-bird. This latter name is very well applied, for the noise which it utters is precisely like the yelping of a small dog. When a person is walking along a pathway within the forest, or on the sea-beach, he will often be surprised to hear on a sudden, close by him, the barking of the *guid-guid*. He may often watch in vain the thicket, whence the sound proceeds, in hopes of seeing its author, and if he endeavour, by beating the bushes, to drive it out, his chance of success will be still smaller. At other times, by standing quietly within the forest, the *guid-guid* will fearlessly hop close to him, and will stand on the trunk of some dead tree, with its tail erect, and strange figure full in view. It feeds exclusively on the ground, in the thickest and most entangled parts of the forest. It rarely takes wing, and then only for short distances. It has the power of hopping quickly and with great vigour; when thus awkwardly proceeding, it carries its short tail in a nearly erect position. I was informed that the *guid-guid*, builds a nest amongst rotten sticks, close to the ground.

2. *PTEROPTOCHOS MEGAPODIUS.* *Kittl.*

*Pterotochos megapodius.* *Kittl.* 1830, Mem. de l'Acad. 1, pl. iv. et Vogel. von Chili, p. 10, pl. iv.

*Megalonyx rufus.* *Less.* Cent. Zool. 1831, pl. 66.

*D'Orb. & Lafr.*

*Leptonyx macropus.* *Swains.* Zool. Ill. pl. 117.

*D'Orb. & Lafr.* Voy. de l'Amer. Mer. Av. 197.

This bird is common in the dry country of central and northern Chile, where it replaces the *P. Tarnii* of the thickly wooded southern regions. The *P. megapodius*, is called by the Chilenos, "*El Turco*;" it lives on the ground amongst the bushes which are sparingly scattered over the stony hills. With its tail erect, every now and then it may be seen popping on its stilt-like legs from one bush to another with uncommon celerity. Its appearance is very strange and almost ludicrous, and the bird seems always anxious to hide itself. It does not run, but hops, and can hardly be compelled to take flight. The various loud cries which it utters, when concealed in the bushes, are as strange as its appearance. I opened the extremely muscular gizzards of several of these birds, and found them filled with beetles, vegetable fibres, and pebbles. Observing the structure of the gizzard, the



fleshy covering to the nostrils, and the arched, rounded wing, and great scratching claws, it was easy to imagine some distant kind of relationship between these birds and those of the Gallinaceous order. I was informed that the Turco makes its nest at the bottom of a deep burrow which it excavates in the ground.

### 3. PTEROPTOCHOS ALBICOLLIS. *Kittl.*

- Pteroptochos albicollis.* *Kittl.* Mem. de l'Acad. Petersb. 1. pl. iii. Vogel von Chili; p. 8. pl. iii.  
*Megalonyx medius.* *Less.* Ill. Zool. pl. lx.  
*Megalonyx albicollis.* *D'Orb. and Lafr.* Mag. de Zool. (1836,) Aves, p. 15.  
*Leptonyx albicollis.* *D'Orb.* Voy. de l'Amer. Mer. Av. p. 196, pl. viii. f. 2.

This species is called by the Chilenos "Tapacolo," or cover your posteriors. The name is well applied, as the Tapacolo generally carries its short tail more than erect, that is, inclined backward and toward the head. It is extremely common in central Chile; and in the same manner as the Turco replaces the Barking-bird of the southern forest-land, so does the Tapacolo replace a fourth species (*P. rubecula*), which is an inhabitant of the same forests. The Tapacolo frequents hedge-rows, and the bushes which are scattered at a considerable elevation over the sterile hills, where scarcely another bird can exist: hence it plays a conspicuous part in the ornithology of Chile. In its manner of feeding, and quickly hopping out of a thicket and back again, in its desire of concealment, unwillingness to take flight, and nidification, it manifests a close resemblance with the *P. megapodius*; its appearance is not, however, so strange, and (as if in consequence) it exposes itself more readily to view. The Tapacolo is very crafty; when frightened by any person, it will remain motionless at the bottom of a bush, and will then, after a little while, try with much address to crawl away on the opposite side. It is also an active bird, and continually making a noise; these noises are various and strangely odd; one is like the cooing of doves, another like the bubbling of water, and many defy all similes. The country people say it changes its cry five times in the year, which is according, I suppose, to some change of season. I was told that the Tapacolo builds its nest at the bottom of a deep burrow, like the Turco; whereas the *P. Tarnii*, (as well as the *P. rubecula*, an inhabitant of the same districts,) makes its nest amongst the sticks just above the ground. This difference in the nidification, of the southern and northern species, is probably due to the nature of the damp forests inhabited by the former in which a burrow could hardly be made dry. I may here observe, that travelling northward from Valparaiso to Coquimbo, I met near Illapel with a bird closely allied to the Tapacolo, but which, from some slight difference in manners, I believed was a distinct species. The range of this supposed species, is from between Coquimbo and Valparaiso, to at least as far north as the valley of Copiapó.

### 4. PTEROPTOCHOS RUBECULA. *Kittl.*

- Pteroptochos rubecula.* *Kittl.* Vog. von Chili, p. 7. pl. ii.  
*Megalonyx rubecula.* *D'Orb. & Lafr.* Mag. de Zool. 1837, p. 16.  
*Megalonyx rufogularis.* *D'Orb. & Lafr.* Voy. de l'Amer. Mer. pl. 7, f. 2.  
*Leptonyx rubecula.* *D'Orb. & Lafr.* Voy. de l'Amer. Mer. Av. p. 196.

This species appears to have nearly the same range with the *P. Tarnii*: its southern limit certainly extends as far as 47° south, but northward, where the forests cease, near Concepcion, I was unable to ascertain that this bird is ever met with, and Kittlitz has made the same remark. In Chiloe, where it is common, it is called by the Indian inhabitants the "Cheucau." It frequents the most gloomy and retired spots within the damp forests. Sometimes, although the cry of the Cheucau is heard close by, a person may watch attentively and yet in vain; at other times, if he stands motionless, the red-breasted little bird will approach within a few feet, in the most familiar manner. It then busily hops about the entangled mass of rotting canes and branches, with its little tail cocked upwards. I opened the gizzard of several specimens; it was very muscular, and contained hard seeds, buds of plants, occasionally some insects, and vegetable fibres mixed with small stones. The Cheucau is held in superstitious fear by the Chilotans, on account of its strange and varied cries. There are three very distinct kinds:—one is called "chiduco," and is an omen of good; another "hui-treu," which is extremely unfavourable; and a third, which I have forgotten. These words are given in imitation of its cries, and the natives are in some things absolutely governed by them. I have already stated that I was informed by the inhabitants that the Cheucau builds its nest amongst sticks close to the ground.

### 5. PTEROPTOCHOS PARADOXUS. *G. R. Gray.*

- Troglodytes paradoxus.* *Kittl.* Vog. von Chili, p. 12, pl. 5.—*Id.* Mem. de l'Acad. St. Peters. 1833, i. pl. 5.  
*Malacorhynchus Chilensis.* *Kittl.* Mem. de l'Acad. St. Peters. 1835, p. 527.  
*Leptonyx paradoxus.* *D'Orb.* Voy. de l'Amer. Mer. Av. p. 197.

This species differs in a small degree from all the others of the genus: its claws are longer, tarsi shorter, and bill flattened at the top: in these, and some other respects, it approaches to *Scytalopus*. I may add, that from a greater degree of resemblance, especially in the feet, *P. Tarnii* and *megapodius* may be ranked in one section, and *P. albicollis* and *rubecula* in another.

I procured specimens of the *P. paradoxus* both from Valdivia and Chiloe; like the *P. Tarnii* and *P. rubecula* it is confined to the regions of forest. Its habits are closely similar to those of the last species. I opened the gizzard of one at Valdivia, and found it full of large seeds and the remnants of insects. In



Chiloe, where it is much less common than the Cheucau, it is called by the inhabitants Cheuqui. Kittlitz procured specimens from Concepcion. He describes the cry which it utters over and over again, in the same high tone, as very singular, and more like that of a frog than of a bird.

SCYTALOPUS MAGELLANICUS. *G. R. Gray.*

*Sylvia Magellanica*, *Lath.* Index, ii. p. 528. ♀ Forst. Dr. No. 163. ♀  
*Scytalopus fuscus*, *Gould*, in Proc. of Zool. Soc. Part iv. 1836, p. 39. ♂  
 ———— *Jard. and Selb.* Ill. Orn. New Ser. pl. 19. ♂  
*Platyrus niger*, *Swains.*, Two Cent. and a Quarter, p. 323. ♂

This bird has a wider range than the species of the foregoing and closely allied genus. It is common near Port Famine in Tierra del Fuego, and on the west coast in the thickly wooded islets of the Chonos Archipelago. I was assured by an intelligent collector that this bird is met with, though rarely, in central Chile; and Mr. Gould informs me, that he has received specimens from that country. It has found its way over to the Falkland Islands, where, instead of inhabiting forests, it frequents the coarse herbage and low bushes, which in most parts conceal the peaty surface of that island. In general appearance the *Scytalopus fuscus* might at first be mistaken for a Troglodytes, but in habits it is closely allied to the several species of Pteroptochos. In a skulking manner, with its little tail erect, it hops about the most entangled parts of the forests of Tierra del Fuego; but when near the outskirts, it every now and then pops out, and then quickly back again. It utters many loud and strange cries: to obtain a good view of it is not always easy, and still less so to make it fly. A specimen I procured at Chiloe had its upper mandible stronger and more arched, but differed in no other respect.

1. TROGLODYTES MAGELLANICUS. *Gould.*

*T. Magellanicus*, *Gould*, in Proc. of Zool. Soc. Part iv. 1836, p. 88.

This bird has a considerable range. I procured specimens of it near Rio de Janeiro, on the banks of the Plata, throughout Patagonia, in Tierra del Fuego, where it is one of the commonest birds, and likewise in Central Chile: its habits resemble very closely those of the common Troglodytes of England. In the open country near Bahia Blanca it lived amongst the thickets and coarse herbage in the valleys; in Tierra del Fuego, in the outskirts of the forest. Its chirp is harsh. In Chile I saw one in October building its nest in a hole in a stone wall, in a situation such as would have been chosen by our Troglodytes.

2. TROGLODYTES PLATENSIS. *Gmel.*

I procured specimens of this bird from Bahia Blanca, in Northern Patagonia, and likewise from the Falkland Islands, where it is not uncommon. When first killed, its legs and beak appear of larger size, compared to its body, than in other species of this genus. In the Falkland Islands it lives, almost exclusively, close to the ground, in the coarse grass which springs from the peaty soil. I do not think I ever saw a bird which, when it chose to remain concealed, was so difficult to disturb. I have frequently marked one down to within a yard on the open grassy plain, and afterwards have endeavoured, quite in vain, by walking backwards and forwards, over the same spot, to obtain another sight of it.

1. SYNALLAXIS HUMICOLA. *Kittl.*

*S. humicola*, *Kittl.* Mem. de l'Acad. St. Peters. i. pl. 6.—*Id.* Vog. von Chili, p. 13, pl. vi.

Not uncommon in the neighbourhood of Valparaiso. Kittlitz has well described its habits. He says it lives on the ground under thickets, that it is active in running about, and that it readily flies from bush to bush. It holds its tail upright; utters a shrill, quickly reiterated cry; feeds on insects; but Kittlitz found in the stomach chiefly grains and berries, with little stones. From these circumstances, he conceives that this bird shews some affinity with Pteroptochos, but I feel no doubt that in the form of its beak, wings, tail, manner of carrying the latter, kind of plumage, sound of voice and habits, the relationship is much closer with Eremobius, which perhaps it may be considered as representing on the Pacific side of the Cordillera. Its tongue is furnished with bristly points, but apparently is less deeply bifid than in the other species of Synallaxis or Limnornis. I obtained both sexes, but there is no difference in their plumage.

For the reason just given, I have put this species at the head of its genus, and therefore nearest to Eremobius, although it is impossible to represent by a linear arrangement, the multiplied relations between the following genera—Furnarius, Uppucerthia, Opetiorhynchus, Eremobius, Anumbius, Synallaxis, Limnornis, Oxyurus; and again, Rhynomya, Pteroptochos, Scytalopus, and Troglodytes, which, with the exception of the last, are strictly South American forms.



## 2. SYNALLAXIS MAJOR. Gould.

PLATE XXII.

*S. olivaceo fuscus; infra fulvus albo distinctè maculatus; plumis singulis stria obscura centrali notatis; fronte rufo, remigibus fuscis, cinereo-fusco externè maculatis, tertiariis nigro fuscis apice margineque latè cinereo-fuscis; guld albâ, plumarum flavescentium serie fusco maculatarum circumdatâ.*

Long. tot. 8 unc.; rost. 1; alæ,  $3\frac{1}{4}$ ; caudæ, 4; tarsi, 1.

Forehead rufous; crown of the head, back of the neck and back olive brown, with a conspicuous stripe of blackish brown down the centre of each feather; wing-coverts and lower part of the back olive brown, with a faint trace of the dark patch in the centre of each feather; primaries brown, margined externally with greyish brown; spurious wing and secondaries rufous tipped with brown; tertiaries blackish brown broadly margined and tipped with greyish brown; two centre tail feathers dark olive brown; the remainder blackish brown largely tipped with white; throat white encircled with a series of feathers of a buff colour spotted with dark brown; breast and all the under surface tawny indistinctly blotched with white; tarsi with a very pale blue tinge.

Habitat, Maldonado, north bank of La Plata. (June).

This bird is not very common. Those which I saw lived on the ground in dry and open places, and did not frequent the neighbourhood of lakes abounding with rushes or thickets, like the greater number of species of Synallaxis, and the allied genus Limnornis. The flight of this bird is peculiar, which seems chiefly due to the length of its elegantly acuminate tail. It sometimes alights and rests on the summit of a thistle or twig, a habit different from that of any species of the genus which I have seen. Its manner of living and feeding on the ground might have been suspected, from the length of the soft secondaries, like those of a lark or of *Furnarius cunicularius*. The claws also of the front toes are produced and perhaps they are rather straighter than in other members of the family. The tongue is bifid and divided into bristly points. The nest, of which I have seen two, is very peculiar. It is cylindrical, about two feet long, and placed vertically in the middle of a thick bush in an exposed situation. It is made externally of prickly branches, and is very large compared with the size of the bird. The opening is at the upper extremity, from which a passage leads to the true nest, which is lined with feathers and hairs. There is a slight bend in the passage both at its exit and where it enters the nest.

## 3. SYNALLAXIS RUFOGULARIS. Gould.

PLATE XXIII.

*S. olivaceo fuscus plumis singulis maculâ oblongâ fusco nigrâ; remigibus primariis secundariisque basi ferrugineo fuscis, apice nigro fuscis, flavescenti albo marginatis; lineâ superciliari, mento abdomineque medio flavescenti albis; guld ferrugineo fuscâ; pectore fulvescenti fusco, plumis singulis striâ pallidiorè centrali ornatis.*

Long. tot.  $6\frac{1}{2}$  unc.; rost.  $\frac{7}{8}$ ; alæ, 3; caudæ,  $3\frac{1}{4}$ ; tarsi, 1.

Head and all the upper surface and two centre tail feathers, brown, with a large oblong patch of brownish black down the centre of each feather; primaries, except the three outer ones, bounded posteriorly with an irregular line of black; secondaries, rusty brown at the base, and brown for the remainder of their length, margined all round with greyish olive; lateral tail feathers brownish black, largely tipped with tawny white; stripe from the nostrils over each eye, chin, and centre of the abdomen, pale buff; sides of the face and throat grey, with a spot of dark brown down the centre of each feather; in the centre of the throat, a patch of ferruginous brown; chest, pale brownish buff, with a fine pale stripe down each feather; bill and feet brown.

Habitat, Patagonia. (April.) Valparaiso. (September.)

These birds are not uncommon on the dry rocky mountains near Valparaiso, and in the valleys of southern Patagonia, where a few thickets grow. They hop actively about the withered herbage and low thickets, and often feed on the ground. The hind claw is weaker and straighter than in most of the other species of this genus.

## 4. SYNALLAXIS MALUROIDES.

*S. maluroides. D'Orb. & Lafr. Voy de l'Amer. Mer. Ois. pl. xiv, f. 2. Mag. de Zool. 1837, Cl. 11, pl. 22.*

My specimens were shot near Maldonado. Iris yellow; tarsi very pale coloured.

This species, as well as some others of Synallaxis, Anumbius, and Limnornis, live amongst reeds and other aquatic plants on the borders of lakes, and have the same general habits. I will, therefore, here describe them. They all have the power of crawling very quickly by the aid of their powerful claws and feet, as I soon discovered when they were not killed at once, for then it was scarcely possible to catch them. Their soft tail-feathers show signs of being used, but they never apply them, as the Certhias do, as a means of supporting their bodies. The tail-feathers were (at least during June) so loosely attached, that I seldom procured a specimen with all of them perfect; and I saw many (especially of *S. maluroides*), flying about with no tail. All the species, or nearly all, utter an



acute, but not loud, rapidly reiterated cry. They are active and busily seek for small insects, chiefly Coleoptera, in the coarse herbage. The iris in all is rusty red; the tongue is divided and terminates in bristly points. These reed birds, which are very numerous both in species and individuals, on the borders of lakes in the provinces north of the Plata, appear to supply in South America, the various *Sylvia*, which frequent similar stations in Europe.

5. *SYNALLAXIS FLAVOGULARIS*. Gould.

Plate XXIV.

*S. supra fuscuscenti cinereus, infra cinereo-fuscus; remigibus obscurè fuscis, basi obscurè rufis; caudæ plumis sex mediis nigro-fuscis, externis ferrugineis; genis gulâque flavescens, plumis singulis apice obscurè fuscis.*

Long. tot.  $6\frac{1}{2}$  unc; rost.  $\frac{3}{4}$ ; alæ,  $2\frac{1}{2}$ ; caudæ,  $3\frac{3}{8}$ ; tarsi,  $\frac{3}{4}$ ;

Head and all the upper surface, brown; primaries, dark brown, with the basal portions rufous; six central tail-feathers, blackish brown; the remainder ferruginous; sides of the face and throat yellowish, with the tip of each feather dark brown; the remainder of the under surface, greyish brown; bill and feet, dark brown.

Habitat, Patagonia.

My specimens were obtained at Bahia Blanca and at Santa Cruz, two extreme parts of Patagonia. It frequents the thinly scattered thickets on the arid plains: the hind claw of its foot is not produced as in *S. rufogularis*, and it lives less on the ground.

6. *SYNALLAXIS BRUNNEA*. Gould.

*S. pallide rubro fusca; primariis secundariisque rufis apice fuscis; caudæ plumis quatuor mediis nigrescenti fuscis, duabus proximis ferrugineo fuscis internè nigrescenti-marginatis, duabus extimis ferrugineo fuscis; genis, gulâ abdomineque medio albescentibus; hypochondriis cinereis.*

Long. tot.  $5\frac{1}{2}$  unc; rost.  $\frac{3}{4}$ ; alæ,  $2\frac{3}{4}$ ; caudæ,  $\frac{5}{8}$ ; tarsi,  $\frac{1}{2}$ .

Head and all the upper surface pale reddish brown; primaries and secondaries, brown at the tip and rufous at the base; four central tail feathers, blackish brown; the next on each side rusty brown, margined internally with blackish brown; the two lateral feathers wholly rusty brown; sides of the face, throat, and centre of the abdomen, whitish; flanks cinereous; bill and feet brown.

Habitat, Port Desire, Patagonia. (*January*.)

This little bird frequents the thickets in the dry valleys near Port Desire. It often flies from bush to bush, and its habits are nearly like those of the rest of the genus. From its tail feathers, however, being little used, and the tarsi being slightly elongated, I suppose it lives chiefly on the ground. I may observe, that this species comes nearest to *S. flavogularis*, but that in the form of its tail, straightness of bill, and kind of plumage, it departs from *Synallaxis*, and approaches *Eremobius*.

7. *SYNALLAXIS ÆGITHALOIDES*. Kittl.

*S. Ægithaloides*. Kittl. Mem. de l'Acad. 11. pl. vii.—Vog. von Chili, p. 15, pl. vii.

This bird is common throughout Patagonia and Central Chile, being found wherever thickets grow on a rocky or dry soil. It sometimes moves about in small flocks. Its habits, as Kittlitz remarks, resemble in many respects, those of a titmouse (*Parus*); but there is one remarkable point of difference, namely, that this bird is able to *run* very quickly on the ground. It does not always do so, but often hops about with great activity; nevertheless, I repeat, I have distinctly seen it running very quickly amongst the thickets. When hopping from twig to twig, it does not use its long tail, any more than the long-tailed titmouse (*Parus caudatus*) of Europe. It utters a harsh, shrill, quickly reiterated cry, like so many other species of this genus and the allied ones. In Chile, I several times saw a very large cylindrical nest, built of prickly twigs of the mimosa, and placed in the middle of a thorn-bearing bush, with its mouth at the upper extremity; I was assured by the country people, that although so very large, it belonged to this little bird.\* This kind of nidification, the habit of feeding on the ground, and the length of acuminate tail, are points of resemblance with *S. major*.

8. *SYNALLAXIS RUFICAPILLA*. Vieill.

*Synallaxis ruficapilla*. Vieill. Gal. des Ois. pl. lxxiv.

*Parulus ruficeps*. Spix. Av. Sp. Nov. tom. 1. p. 84, t. lxxxvi. f. 1. m. f. 2. fem.

*Sphenura ruficeps*. Licht. Ver. p. 42.

My specimens were obtained at Maldonado, (June) where it was rare, and at Buenos Ayres. Near Santa Fè, in Entre Rios, 3° northward, it was common: Spix found it near the Rio San Francisco in Brazil. Iris yellowish red; legs with faint tinge of blue; tongue terminated in bristly points, not deeply bifid. This *Synallaxis* approaches in character *Amumbius ruber*. Habits similar to those of *S. maluroides*.

\* Molina, in his account of Chile, attributes this nest, I believe, through an error, to *Mimus thenca*.



ANUMBIUS RUBER. *D'Orb. and Laf.*Anumbius ruber. *D'Orb. & Laf. Mag de Zool*, 1838, p. 18.Furnarius ruber. *Vieill. Ency. Meth.* 514.Anumbi rouge. *Azara*, No. 220.

Frequents reeds on the borders of lakes near Maldonado. Habits very similar to those of *Synallaxis maluroides*, and likewise of the two species of *Limnornis*; to one of which *L. curvirostris*, it is most closely allied in structure. Iris bright yellowish orange; tarsi, with faint tinge of blue; tongue divided on each side a little below the extreme point.

GENUS.—LIMNORNIS. *Gould.*

Rostrum capitis longitudine seu longius, leviter a basi ad apicem arcuatum, lateraliter compressum, haud emarginatum; naribus magnis basalibus linearibus apertis aut partim operculo tectis: alæ brevissimæ rotundæ, plumis quarta, quinta sextaque ferè æqualibus et longissimis; cauda rotundata et graduata, scapis aliquanto ultra radios productis; tarsi mediocres, fortiter scutellati; halluce digito medio brevior, robusto, ungue robusto armato, digitis lateralibus ferè æqualibus, intermediis aliquantò brevioribus.

1. LIMNORNIS RECTIROSTRIS. *Gould.*

Plate XXVI.

*L. pallide flavescenti fusca; cervice nigrescenti fusco; caudâ rufa; tectricibus primariis secundariisque fuscis rufo latè marginatis; fasciâ pone oculos, gulâ abdomineque flavescenti albis; hypochondriis fulvis.*

Long. tot.  $6\frac{3}{8}$  unc.; rostr.  $\frac{2}{12}$ , alæ,  $2\frac{6}{12}$  caudæ,  $2\frac{9}{12}$  tarsi,  $\frac{9}{12}$ .

Crown of the head brown; the remainder of the upper surface, pale yellowish brown; tail rufous and acutely pointed; wing coverts, primaries and secondaries brown, broadly margined with rufous; stripe behind the eye, throat, and all the under surface buffy white; flanks tawny; bill lengthened, orange at the base, dark brown at the tip; iris rusty red; feet very pale coloured; claws whitish.

Habitat, Maldonado, La Plata. (*June.*)

This bird lives amongst the reeds on the borders of lakes. It often alights vertically on stems of plants, but in climbing does not use its tail: habits, generally similar to those of *Synallaxis maluroides*.

2. LIMNORNIS CURVIROSTRIS. *Gould.*

PLATE XXV.

*L. rufescenti-fusca; caudâ, remigiumque basibus pallidè castaneo-fuscis, lineâ superciliari, genis, gulâ abdomineque albis; hypochondriis cervino tinctis.*

Long. tot. 7 unc., rostr.  $1\frac{1}{8}$ ; alæ,  $2\frac{1}{2}$ ; caudæ,  $3\frac{1}{12}$ ; tarsi,  $\frac{1}{12}$ .

Head, all the upper surface, and wings reddish brown; tail and basal portion of the outer margins of the primaries and secondaries reddish chestnut brown; stripe over the eye, throat, and all the under surface white, tinged, especially on the flanks, with fawn colour; bill orange at the base, the tip brown; legs pale bluish; claws white; tongue bristled on the sides; near the extremity it is divided into little bristly points.

Habitat, Maldonado, La Plata. (*June.*)

This species frequents the same localities with the last, and I am unable to point out any difference in its habits. Of the two specimens collected, the beak of one is very nearly one-tenth of an inch longer than that of the other; but this is almost wholly due to the sharp point of the upper mandible projecting beyond the lower mandible in the one, whereas they are nearly equal in the other.

1. OXYURUS TUPINIERI. *Gould.*Synallaxis tupinieri. *Less. Zool. de la Coqu.* pl. 29. f. 1.Oxyurus ornatus. *Suains.* 2 Cent. and  $\frac{1}{4}$ . p. 324.

This bird is perhaps the most abundant of any land species inhabiting Tierra del Fuego. It is common along the west coast, (and numerous in Chiloe,) even as far north as a degree south of Valparaiso; but the dry country and stunted woods of central Chile are not favourable to its increase. In the dark forests of Tierra del Fuego, both high up and low down, in the most gloomy, wet, and scarcely penetrable ravines, this little bird may be met with. No doubt, it appears more common than it really is, from its habit of following, with seeming curiosity, every person who enters these silent woods; continually uttering a harsh twitter, it flutters from tree to tree, within a few feet of the intruder's face. It is far from wishing for the modest concealment of the creeper (*Certhia familiaris*); nor does it, like that bird, run up the trunks of trees, but industriously, after the manner of a willow wren, hops about and searches for insects on every twig and branch.



## 2. OXYURUS? DORSO-MACULATUS. Gould.

*Synallaxis dorso-maculata.* D'Orb. and Lafr. Voy. de l'Amer. Mer. Ois. pl. 14. f. 1.  
Mag. de Zool. 1837, Cl. 11. p. 21.

My specimen was procured from Maldonado, (June), where it was not common. It frequents the same localities with *Synallaxis maluroides*, and the two species of *Limnornis*, and has very similar habits with them. In structure, and in the general shade of its plumage, it is closely allied to the foregoing species, although differing from it in habits.

## GENUS.—DENDRODRAMUS. Gould.

*Rostrum capitis longitudine, aut longius, culmine recto, gonide ascendente, per omnes partes lateraliter compressum, durum et apice inemarginatum, naribus basalibus longitudinalibusque; alæ mediocres et subacuminatæ, plumis tertia, quarta et quinta æqualibus longissimisque; cauda mediocris, scapis ultra radios in spinas acutas productis; tarsi sub-breves, digitis unguibusque longis, his multum curvatis, digito externo valido et ferè digiti medii longitudine, digitis lateralibus inæqualibus, internis multum brevioribus.*

## DENDRODRAMUS LEUCOSTERNUS. Gould.

Plate XXVII.

*D. capite, dorsi parte superiore alisque nigrescenti fuscis, rubro-tinctis; primariis secundariisque subferrugineo fusco irregulariter marginatis, uropygio caudæque nitidè ferrugineis, gulæ pectoreque albis, abdomine medio rufescenti fusco, singulis plumis ad apicem maculâ magnâ ovali albâ; hypochondriis saturatè rufis; rostro basi corneo, apice pedibusque nigro fuscis.*

Long. tot.  $6\frac{3}{12}$  unc.; rostri,  $1\frac{1}{12}$ ; alæ, 3; caudæ,  $2\frac{0}{12}$ ; tarsi,  $\frac{0}{12}$ .

Head, upper part of the back and wings blackish brown, tinged with red; primaries and secondaries irregularly margined with dull rusty brown; rump and tail rich ferruginous; throat and chest white; feathers of the centre of the abdomen reddish brown, with a large oval spot of white near the tip of each feather; flanks deep rufous; bill horny at the base, the remainder and the feet blackish brown.

Habitat, Chiloe and Southern Chile.

This bird is common in the forests of Chiloe, where, differently from the *Oxyurus tupinieri*, it may constantly be seen running up the trunks of the lofty forest

trees. Its manners appeared to me to resemble those of *Certhia familiaris*. I found Coleopterous insects in its stomach. Its range does not appear to be extensive; Chiloe to the south, and some woods near Rancagua (a degree south of Valparaiso) were the extreme points where I met with it. The *Dendrodramus* is not found in Tierra del Fuego, where the *O. tupinieri* is so numerous. Mr. G. R. Gray remarks that this genus is very nearly allied to *Dendroplex* of Mr. Swainson.

## FAMILY.—SYLVIADÆ.

## SUB-FAM.—MOTACILLINÆ.

## 1. MUSCISAXICOLA MENTALIS. D'Orb. &amp; Lafr.

*M. mentalis*, D'Orb. & Lafr. Mag. de Zool. 1837, p. 66.  
Voy. dans l'Amer. Mer. Ornith. pl. 40, f. 1.

I procured specimens of this bird from Bahia Blanca, in Northern Patagonia, from Tierra del Fuego, from Chiloe, and from Central and Northern Chile. It is everywhere common. It frequents open places; so that in the wooded countries it lives entirely on the sea-beaches, or near the summits of mountains, where trees do not grow. In the excessively sterile upper valleys of the Cordillera of Northern Chile I met with this bird, even at a height of little less than ten thousand feet, where the last traces of vegetation occur, and where no other bird lives. It generally moves about in very small flocks, and frequents rocky streams and marshy ground: it hops and flies from stone to stone, very much after the manner of our whinchat (*Motacilla rubetra*), but when alighting it frequently expands its tail like a fan. The sexes are exactly similar in size and plumage.

Mr. G. R. Gray observes, that the genus *Muscisaxicola* is probably synonymous with *Lessonia* of Mr. Swainson; but the latter name cannot be used, as it has already been twice employed in other branches of Natural History.

## 2. MUSCISAXICOLA MACLOVIANA. G. R. Gray.

*Sylvia macloviana*, Garn. Voy. de la Coqu. Zool. p. 663.  
*Curruca macloviana*, Less.

I brought home only one specimen of this bird; it came from East Falkland Island, whence also those described by Messrs. Lesson and Garnot were procured. Mr. Gould considered it a distinct species, but having carefully compared it with *M. mentalis*, I can see not the smallest difference in any point, excepting that it



is somewhat larger in all its dimensions. The length of the whole body is .6 of an inch greater, of wing when folded .45, of tarsus .2, greater than in the foregoing species. I can scarcely hesitate in thinking it a large-sized local variety, from some favourable condition in the Falkland Islands to its growth.

### 3. MUSCISAXICOLA BRUNNEA. Gould.

*M. griseo-fusca; gutture abdomineque albis flavescenti tinctis, pectore obscuro; alis caudâque obscure fuscis, singulis plumis rufescenti fusco marginatis; rectricum externarum radiis lateralibus flavescentibus.*

Long. tot. 5 unc.; rostri,  $\frac{1}{6}$ ; ala,  $3\frac{1}{2}$ ; caudæ,  $2\frac{1}{2}$ ; tarsi, 1.

Head, and all the upper surface greyish brown; wings and tail dark brown, each feather margined with reddish brown; the outer webs of the external tail feathers buffy white; throat and all the under surface white, slightly tinged with buff; bill and feet blackish brown.

Habitat, Port St. Julian, Patagonia. (*January*).

The only specimen I procured was immature.

### 4. MUSCISAXICOLA NIGRA. G. R. Gray.

*Alauda nigra, Boddater.*

—— *rufa, Gmel.*

—— *fulva, Lath. Index.*

*Anthus fulvus, Vieill. Ency. Meth. p. 309.*

—— *variegatus, Gerv. & Eydoux, Mag. de Zool. 1836, p. 26.*

*Sylvia dorsalis, King.*

*Lessonia erythronotus, Swains. Class. of Birds.*

*Alouette noire à dos fauve, Pl. enl. 738.*

*L'Alouette à dos rouge, Azara, No. 149.*

This bird has a wide geographical range. It is found in La Plata, Patagonia, Tierra del Fuego, and on the west coast at least as far north as the valley of Copiapó, in Northern Chile. It is every where common: it is a quiet, tame, inoffensive little bird: it lives on the ground, and frequents sand-dunes, beaches, and rocky coasts, which it seldom leaves: the broad shingly beds of the rivers in Chile have, however, tempted it inland, together with the *Opetiorhynchus*. I was told that it builds in low bushes.

### 1. ANTHUS CORRENDERA. Vieill.

*Anthus correndera, Vieill. Ency. Meth. i. p. 325.*

*La correndera, Azara, No. 145.*

This titlark is found in La Plata, Chile, and the Falkland Islands. I was informed by an intelligent sealer, that it is the only land-bird on Georgia and South Orkney (lat. 61° S.): it has, therefore, probably a further range southward than any other land-bird in the southern hemisphere. It does not live in flocks, is very common, and resembles a true *Alauda* in most of its habits. This species (as well as the following) is so closely allied to our meadow pipit, *Anthus pratensis*, that Latham considered it only as a variety; the latter has a high northern range, as the former has a southern one. There can be little doubt that the bird alluded to by Mr. Yarrell (British Birds, p. 392, vol. i.) as having been caught in the Southern Atlantic Ocean, nine hundred miles from Georgia, was this species, which was mistaken, owing to its close similarity, for the true *Anthus pratensis*.

### 2. ANTHUS FURCATUS. D'Orb. & Lafr.

*A. furcatus, D'Orb. & Lafr. Mag. de Zool. 1836, p. 27. Voy. de l'Amer. Mer. Av. p. 227.*

My specimens were procured on the northern bank of the Plata. It is more common there than the foregoing species, to which it is most closely allied: its chief distinguishing character appears to be the greater shortness of its toes and of the hind claw. I have seen this species alight on twigs. In the breeding season it flies upward, and then falls to the ground, with raised wings, in the peculiar manner common to the *Anthus arboreus* of England. It builds on the ground; nest simple; egg  $\frac{1}{12}$  of an inch in length, and  $\frac{7}{12}$  in width; colour dirty white, with small specks and blotches of dull red and obscurer ones of purple. This species, both in habits and structure, appears to be an analogue of *A. arboreus* of the northern hemisphere, as *A. correndera* is of *A. pratensis*. Mr. Yarrell informs me that the egg of *Anthus furcatus* is very different from that of *A. arboreus*, although the parent birds are so similar.

### 3. ANTHUS CHII. Licht.

*A. Chii, Licht. Spix. Av. Sp. No. i. t. lxxvi. fig. 2, p. 75.*

*Le Chii, Azara, No. 146.*

My specimen was procured at Rio de Janeiro, in Brazil.



SYLVICOLA AUREOLA. *Gould.*

PLATE XXVIII.

*S. supra flavescenti olivacea; fronte cerviceque nitide flavis, singulis plumis ad apicem rufescenti castaneis; occipite griseo; alis caudæque nigrescentibus, latè flavo-marginatis; genis guttureque nitidè flavis; pectore concolori sed singulis plumis in medio pallidè castaneo notatis; abdomine albescenti.*

Long. tot. 5 unc.; rostri,  $\frac{3}{12}$ ; alæ,  $2\frac{6}{12}$ ; caudæ,  $2\frac{3}{12}$ ; tarsi,  $\frac{10}{12}$ .

The nape of the neck, back and tail-coverts yellowish olive; the wings and tail blackish, broadly margined with yellow; the front and crown yellow, with the tips of the feathers reddish castaneous; the hind head grey mixed with yellow, the cheeks and the throat bright yellow; the breast of the same colour, but each feather is marked down the middle with pale reddish castaneous, the sides and middle of the abdomen whitish.

Habitat, Galapagos Archipelago. (*September*).

This bird is not uncommon on these islands. It has the habits of our *Sylvia*. It frequents the thickets in the lower, dry and rocky parts of the island, and especially a peculiar bush, with thick foliage, which grows only near the sea-coast.

CYANOTIS OMNIColor. *Swains.*

*Regulus omnicolor*, Vieill. Gal. pl. 166.

*Sylvia rubrigastra*, Vieill.

*Regulus Byronensis*, Gray, Griff. An. King. pl.

*Tachuris omnicolor*, D'Orb. & Lafr.

*Tachuris roi*, Azara, No. 161.

My specimens were obtained at Maldonado in June, and therefore probably it is not a bird of passage. It frequented reeds on the borders of a lake, but was exceedingly rare. I likewise saw one in Northern Patagonia, and in a collection of birds at Santiago, in Chile, made there by an inhabitant of the place. The soles of the feet of this exquisitely beautiful little bird are bright orange.

TRICHAS VELATA. *G. R. Gray.*

*Sylvia velata*, Vieill. Ois. de l'Amer. Sept. ii. pl. 74.

— *D'Orb. & Lafr. Mag. de Zool. 1836, p. 20.*

*Tanagra canicapilla*, Swains. Ill. Orn. pl. 174.

*Trichas canicapilla*, Swains.

My specimen was procured at Maldonado in June.

## FAMILY.—FRINGILLIDÆ.

SUB-FAM.—ALAUDINÆ.

MELANOCORYPHA CINCTURA. *Gould.*

*M. Fæm. fuscescanti rufa; gulâ abdomineque medio pallidioribus; remigibus ad apicem nigrescenti fuscis; rectricibus singulis maculâ albâ ovatâ nigrescenti fuscâ ad apicem notatis.*

Long. tot.  $5\frac{3}{4}$  unc.; alæ,  $3\frac{1}{4}$ ; caudæ,  $2\frac{1}{4}$ ; tarsi,  $\frac{3}{4}$ ; rost.  $\frac{1}{2}$ .

The whole of the plumage, bill, and feet, sandy rufous brown, which is lightest on the throat and centre of the abdomen; primaries near their extremities passing into blackish-brown; and each of the tail feathers with a large oval spot of blackish-brown near the tip.

Habitat, St. Jago, Cape Verde Islands. (*September*).

This bird inhabits the most arid plains of lava; it runs, and in its habits resembles, in many respects, a lark.

PYRRHALAUDA NIGRICEPS. *Gould.*

*P. supra fuscescanti alba, plumis medio obscurioribus; fronte, genis linedque pectoris utrinque albis; corpore infra linedque à basi rostri supra oculos ad occiput transiente nigris; caudæ plumis mediis nigrescentibus fuscescanti albo marginatis, plumis externis atris.*

Long. tot.  $4\frac{3}{8}$  unc., alæ,  $2\frac{5}{8}$ ; caudæ,  $1\frac{3}{8}$ ; tarsi,  $\frac{6}{10}$ ; rost.  $\frac{4}{10}$ .

Upper surface brownish-white, with the middle of the feathers darker; the front, cheeks, and a line on each side of the breast white; beneath the body, and a line from the bill passing over the eyes to the hind head, black; the tail with the middle feathers blackish, margined with brownish-white, the outer feathers deep black; the bill and feet pale.



Habitat, St. Jago, Cape Verde Islands. (*September and January.*)

Like the last species, this bird inhabits sterile lava plains; it runs like a lark, and generally goes in small flocks.

SUB-FAM.—PYRRHULINÆ.

SPERMOPHILA NIGROGULARIS. *Gould.*

*S. capite corporeque supra, alis caudâque fusco cinereis; loris gulâque nigris; lineis à rostri angulis per collum utrinque descendentibus, pectore abdomineque mediis, tegminibusque caudalibus inferioribus cinereo albis.*

*Fem. ? supra olivaceo fusca, subtus pallidior.*

Long. tot. 3 unc.; *alæ*,  $2\frac{1}{4}$ ; *caudæ*, 2; *tarsi*,  $\frac{3}{8}$ ; *rostri*,  $\frac{5}{16}$ .

Male.—Head, all the upper surface, wings and tail, brownish-grey; lores and throat black; lines from the angle of the bill down each side of the neck, centre of the chest and abdomen, and the under tail coverts greyish-white; bill light horn colour; feet dark-brown.

Female?—The whole of the plumage olive-brown above, and lighter beneath; bill and feet brown.

Habitat, Monte Video. (*November.*)

1. CRITHAGRA? BRASILIENSIS.

*Fringilla Brasiliensis, Spix. Av. Sp. Nov. ii. t. lxi. f. 1. m. 2. fem. p. 47.*

My specimens were obtained from the northern bank of the Plata, in the months of June and November.

2. CRITHAGRA? BREVIROSTRIS. *Gould.*

*C. vertice dorsoque pallidè olivaceo fuscis, plumis singulis striâ angustâ mediâ nigro-fuscâ, pennis scapularibus alis caudâque nigrofuscis cinereo olivaceo latè marginatis; uropygio virescenti flavo; loris, gulâ, pectore humero infra, abdomine, tegminibusque caudæ inferioribus latè flavis.*

Long. tot. 5 unc.; *rostri*,  $\frac{7}{16}$ ; *alæ*,  $2\frac{5}{8}$ ; *caudæ*,  $2\frac{1}{4}$ ; *tarsi*,  $\frac{5}{8}$ .

Crown of the head and back, light olive-brown, with a narrow stripe of blackish-brown in the centre of each feather; scapularies, wings and tail, blackish-brown, broadly margined with greyish olive; rump greenish-yellow; lores,

throat, chest, under surface of the shoulders, abdomen, and under tail-coverts bright yellow: bill and feet brown.

Habitat, Maldonado (*May*), and Valparaiso (*September*).

Near Maldonado, I saw very large flocks of this species feeding on the open grassy plains. When the whole flock rises, these birds utter a low but shrill chirp. In Chile I obtained only one specimen.

SUB-FAM.—EMBERIZINÆ.

1. EMBERIZA GUBERNATRIX. *Temm.*

*Emberiza gubernatrix, Temm., Pl. Col. 63 & 64.*

—— cristata, *Suains, Zool. Ill. pl. 148.*

—— cristatella, *Vieill. Gal. des Ois. pl. 67.*

Yellow crested grosbeak, *Lath. Hist.*

La huppe jaune, *Azara, No. 129.*

My specimen was procured on the banks of the Parana, near Santa Fe, in latitude 31° S.

2. EMBERIZA LUTEOVENTRIS. *G. R. Gray.*

*Fringilla luteoventris, Meyen, Nov. Act. 1880, pl. 12. f. 3.*

This bird was procured at Santa Cruz, in Southern Patagonia; it was rare there.

CHRYOMETRIS CAMPESTRIS. *Gould.*

*Fringilla campestris, Spix. Avium Nov. Sp. ii. p. 47, pl. 59. f. 3. ♀*

*C. Mas: olivaceus; dorsi plumis singulis flavo marginatis, uropygii præsertim; vertice, gulâ, alis caudâque nigris, alis caudâque plus minusve flavo-marginatis; capitis lateribus corporeque infra latè flavis.*

Long. tot. 4 unc. 11 lin.; *rost.* 5 lin.; *alæ*,  $2\frac{3}{4}$ ; *caudæ*,  $2\frac{1}{4}$ ; *tarsi*, 7 lin.

Male; olivaceous, with each feather of the back margined with yellow, especially on the rump; the top of the head, throat, wings and tail, black, the two latter margined more or less with yellow; the sides of the head and beneath the body bright yellow.

Habitat, forests of Tierra del Fuego (*February*), Valparaiso (*September*).



## SUB-FAM.—FRINGILLINÆ.

1. AMMODRAMUS LONGICAUDATUS. *Gould.*

## PLATE XXIX.

*A. vertice humeroque cinereofuscis, dorso pallescenti fusco, uropygio rufescenti fusco tincto, plumis singulis strigâ mediâ fuscâ; tectricibus alarum majoribus, remigibus primariis secundariisque et caudâ nigrescentibus, cinereo albo externe marginatis; fronte, strigâ superciliari corporeque infra flavescentibus.*

Long. tot.  $5\frac{3}{4}$  unc.; alæ,  $2\frac{3}{8}$ ; caudæ, 3; tarsi,  $\frac{3}{8}$ ; rostri,  $\frac{9}{16}$ .

Crown of the head and shoulder, greyish brown; back, light brown, tinged with reddish brown on the rump, and with a stripe of dark brown down the centre of each feather; greater wing-coverts, primaries, secondaries, and tail blackish, margined externally with greyish white; forehead, stripe over the eye, and all the under surface, buff; bill black; feet brown. Young, or a bird after gaining its new plumage, differs in having the whole of the upper surface rich brown, with a tinge of olive and with a stripe of dark brown down each feather, and in having the wing coverts margined with reddish instead of greyish brown.

Habitat, Monte Video (*November*), Maldonado (*June*).

At Maldonado this bird frequented, in small flocks, reeds and other aquatic plants bordering lakes. In general habits, as well as in place of resort, it resembles those species of *Synallaxis* and *Limnornis*, with which it is often associated. It appears to live entirely on insects, and I found in the stomach of one which I opened various minute *Coleoptera*. Mr. Gould remarks, that the structure of this *Ammodramus* is very remarkable, for that it has a great general resemblance both in form and colouring to *Synallaxis*, although the thickness of its bill shows its relation to the *Fringillinæ*. In its habits it certainly is more allied to the former genus, than to its own family.

2. AMMODRAMUS MANIMBE, *G. R. Gray.*

## PLATE XXX.

*Ammodramus xanthornus*, in Plate, and in Gould's MS.  
*Fringilla Manimbè*, *Licht.*, Cat. No. 253.  
*Emberiza Manimbè*, *D'Orb. & Lafr.*, Syn. p. 77.  
*Manimbè*, *Azara*, No. 141.

My specimen was obtained from Maldonado.

1. ZONOTRICHIA MATUTINA. *G. R. Gray.*

*Fringilla matutina*, *Licht.*, Cat. 25.

——— *Kittl.* Kupfertafeln der Vögel, pl. 23. f. 3.

*Tanagra ruficollis*, *Spix*, Av. Sp. Nov. ii. t. liii. f. 3. p. 39.

Chingolo, *Azara*, No. 135. Chingolo Bunting, *Lath. Hist.*

I procured specimens of this species from the banks of the Plata, Bahia Blanca in Northern Patagonia, and from Valparaiso in Chile: in these countries it is perhaps the commonest bird. In the Cordillera, I have seen it at an elevation of at least 8000 feet. It generally prefers inhabited places, but it has not attained the air of domestication of the English sparrow, which bird in habits and general appearance it represents. It does not go in flocks, although several may be frequently seen feeding together. At Monte Video I found on the ground the nest of this species. It contained three eggs; these were .75 of an inch in length; form, rather rounded; colour, dirty white, with numerous small spots of chesnut and blackish brown, almost confluent towards the broadest end. It was in this nest that I found the parasitic egg, supposed to belong to a species of *Molothrus*, described in my journal.\*

2. ZONOTRICHIA CANICAPILLA. *Gould.*

*Z. vertice cinereo; loris regioneque parotidâ obscure fuscis; dorso collique lateribus rufis, dorso superiori et uropygio fuscis; dorso medio nigrescenti fusco, plumis singulis pallido fusco marginatis; tectricibus alarum nigrescenti fuscis, rufescente fusco marginatis, apice albis, duas fascias obliquas trans alarum formantibus.*

Long. tot.  $5\frac{1}{2}$  unc.; alæ,  $2\frac{7}{8}$ ; caudæ,  $2\frac{1}{2}$ ; tarsi,  $\frac{7}{8}$ ; rostri,  $\frac{1}{2}$ .

Crown of the head grey; lores and ear-coverts dark brown; back and sides of the neck rufous; upper part of the back and rump brown; centre of the back blackish brown, each feather margined with light brown; wing-coverts blackish brown, margined with reddish brown, and tipped with white, forming two oblique bands across the wing; primaries, secondaries, and tail, dark brown, margined with greyish brown; throat and all the under surface brownish grey; and feet brown.

Habitat, Port Desire in Patagonia, and Tierra del Fuego.

This species is not uncommon in Tierra del Fuego, wherever there is any open

\* Journal of Researches during the Voyage of the Beagle, p. 60.



space. Of the few birds inhabiting the desert plains of Patagonia, this is the most abundant. At Port Desire I found its nest: egg, about .83 in length; form somewhat more elongated than in that of the last species; colour, pale green, almost obscured by minute freckles and clouds of pale dull red.

### 3. ZONOTRICHIA STRIGICEPS. Gould.

*Z. capite castaneo, lineâ mediâ obscure diviso, plumis singulis striâ mediâ nigrofusca, humeri flexurâ rufâ; corpore supra fusciscente, plumis singulis striâ latâ mediâ obscure fusca; remigibus, primariis caudâque nigro-fuscis pallidè fusco marginatis; strigâ superciliari, faciei collique lateribus, gulâ pectore abdomineque medio cinereis; hypochondriis tegminibusque caudæ inferioribus flavescens.*

Long. tot.  $5\frac{3}{4}$  unc.; rostri,  $\frac{1}{2}$ ; alæ,  $2\frac{1}{2}$ ; caudæ,  $2\frac{7}{8}$ ; tarsi,  $\frac{5}{8}$ .

Head chestnut, divided down the middle by a line of deep grey, each feather with a stripe of blackish brown down the centre; point of the shoulder rufous; the remainder of the upper surface light brown, with a broad stripe of dark brown down the centre of each feather; primaries and tail brown; secondaries blackish brown, margined all round with pale brown; stripe over each eye, sides of the face and neck, throat, breast, and centre of the abdomen, grey; flanks and under tail-coverts buff; upper mandible black; under mandible light horn colour; feet brown.

Habitat, Santa Fe. Lat.  $31^{\circ}$  S. (October.)

This species appears to replace in this latitude the *Z. matutina*, which is so abundant on the banks of the Plata and in Chile, as that species does the *Z. canicapilla* of Patagonia and Tierra del Fuego.

### PASSERINA JACARINA. Vieill.

Tanagra jacarina, Linn.  
Passerina jacarina, Vieill. Ency. Meth. p. 933.  
Emberiza jacarina, D'Orb. & Lafr., Syn.  
Le Sauter, Azara, No. 138.  
Euphonia jacarina, Licht. Cat. p. 30.  
Fringilla splendens, Vieill. Ency. p. 981?

I procured a specimen of this bird at Rio de Janeiro.

### 1. FRINGILLA DIUCA. Mol.

Fringilla Diuca, Kittl. Mem. de St. Petersb. t. i. pl. 11.

Mag. de Zool. 1837, pl. 69.

Emberiza Diuca, D'Orb. et Lafr. Syn. Mag. of Zool. 1838, f. 77.

This bird is very common on the coast of Chile, from the humid forests of Chiloe to the desert mountains of Copiapó. In Chiloe it is perhaps the most abundant of the land birds; south of Chiloe I never saw it, although the nature of the country does not change them. On the eastern side of the continent, I met with this bird only at the Rio Negro, in northern Patagonia. I do not believe it inhabits the shores of the Plata, although so common in the open country, under corresponding latitudes west of the Cordillera. The Diuca, as this Fringilla is called in Chile, generally moves in small flocks, and frequents, although not exclusively, cultivated ground in the neighbourhood of houses: habits very similar to those of the *Zonotrichia matutina*. During incubation, the male utters two or three pleasing notes, which Molina has in an exaggerated description called a fine song. In October, at Valparaiso, I found the nest of this bird in the trellis-work of a vineyard, close by a much frequented path. The nest is shallow, and about six inches across; the outer part is very coarse, and composed of the thin stalks of twining plants, strengthened by the husky calices of a composite flower; this outside part is lined by many pieces of rag, thread, string, tow, and a few feathers. Eggs rather pointed, oval, .94 of an inch in length; colour, pale dirty green, thickly blotched by rather pale dull-brown, which small blotches and spots become confluent, and entirely colour the broad end.

### 2. FRINGILLA GAYI. Eyd. & Gerv.

Fringilla Gayi, Eyd. & Gerv. Mag. de Zool. 1834. pl. 23.

Emberiza Gayi, var. D'Orb. & Lafr. Syn. p. 76.

This Fringilla, which was first brought from Chile, is abundant in the southern parts of Patagonia.

### 3. FRINGILLA FORMOSA. Gould.

*F. fronte lorisque nigris; vertice, genis, gulâ, alarum tegminibus cæruleo griseis, tegminibus primariis, secundariis rectricibusque griseo-nigris, cærulescenti-griseo marginatis, dorso flavescens castaneo; tegminibus caudalibus inferioribus pallidè griseis; uropygio pectore abdomine hypochondriisque saturatè flavis.*

Long. tot.  $5\frac{1}{2}$  unc.; alæ,  $3\frac{1}{4}$ ; caudæ,  $2\frac{3}{8}$ ; tarsi,  $\frac{3}{4}$ ; rostri,  $\frac{1}{2}$ .

Forehead and lores black; crown of the head, sides of the face, throat, wing



coverts, and the margins of the primaries, secondaries, and tail feathers, blue grey; the remainder of the primaries, secondaries, and tail feathers, greyish-black; back yellowish-chestnut; under tail coverts light-grey; rump, breast, abdomen and flanks, deep wax-yellow; bill bluish horn-colour; feet light brown.

Habitat, Tierra del Fuego (*December and February*).

This finch is common on the outskirts of the forests in Tierra del Fuego. Mr. Gould remarks, that it is nearly allied to *F. Gayi*, but it is much smaller, and is richer in its colouring.

#### 4. FRINGILLA FRUTICETI, *Kittl.*

*Fringilla fruticeti*, *Kittl.* Kupf. der Vögel, pl. 23. f. 1.

*Emberiza luctuosa*, *Eyd. et Gerv.* Mag. de Zool. 1834. Cl. 11. pl. 71.

————— *D'Orb. et Lafr.* Syn. p. 80.

I obtained specimens of this bird from Northern Chile, and Southern Patagonia. I saw it also in the Cordillera of Central Chile, at an elevation of at least eight thousand feet, near the upper limit of vegetation. In Patagonia it is not common, it frequents bushy valleys in small flocks, from six to ten in number. These birds sometimes move from thicket to thicket with a peculiar soaring flight: they occasionally utter very singular and pleasing notes.

#### 5. FRINGILLA CARBONARIA. *G. R. Gray.*

*Emberiza carbonaria*, *D'Orb. et Lafr.* Synop. p. 79.

I never saw this bird but once, and then it was in small flocks, on the most desert parts of the plains between the rivers Negro and Colorado, in Northern Patagonia.

#### 6. FRINGILLA ALAUDINA. *Kittl.*

*Fringilla alaudina*, Kupf. der Vögel, pl. 23. f. 2.

*Emberiza guttata*, *Meyen*, Nov. Act. Cur. xvii. pl. 12.

————— *D'Orb. & Lafr.* Syn. p. 78: Adult.

*Passerina guttata*, *Eyd. & Gerv.* Mag. de Zool. 1834. pl. 70. p. 22.

My specimens were obtained from the neighbourhood of Valparaiso.

\*

#### 1. PASSER JAGOENSIS. *Gould.*

PLATE XXXI.

*Pyrgita Jagoensis*, *Gould*, Proc. of Zool. Soc. 1837. p. 77.

*P. summo capite, et maculâ parvâ gulari intensè nigrescenti-fuscis; strigâ superciliari, collo, humeris dorsoque intensè castaneis, hujus plumis strigâ fuscâ centrali notatis; alis caudâque brunneis, tectricibus alarum minoribus albis, qui color fasciam transversam efficit: lined angustâ albâ à nare ad oculum; genis corporeque subtus albis, hoc colore in cinereum ad latera transeunte: rostro, pedibusque fuscis.*

Long. tot. 5 unc.; caudæ,  $2\frac{1}{4}$ ; alæ,  $2\frac{1}{2}$ ; rost.  $\frac{1}{2}$ ; tarsi,  $\frac{5}{8}$ .

Crown of the head and a small mark on the throat intense blackish brown, with a stripe on the eyebrows, the neck, shoulders and back bright chestnut, the feathers of the latter marked with a central dusky streak; wings and tail brown, with the smaller wing coverts white, forming a transverse bar; a narrow white line from the nostrils to the eye; cheeks and under side of body white, this colour passing into grey on the sides; beak and feet dusky.

Habitat, St. Jago, Cape Verde Islands (*January*).

This is the commonest bird in the island; it frequents, generally in small flocks, both the neighbourhood of houses and wild uninhabited spots. It was building its nest towards the end of August.

#### 2. PASSER HISPANIOLENSIS. *G. R. Gray.*

*Fringilla Hispaniolensis*, *Temm. Man.* i. 353.

In the month of January I obtained a specimen of this bird from St. Jago, one of the Cape Verde Islands, where it was not common.

#### 1. CHLOROSPIZA? MELANODERA. *G. R. Gray.*

PLATE XXXII.

*Emberiza melanodera*, *Quoy & Gaim.* Voy. de L'Uranie, Zool. i. p. 109.

*C. flavescenti olivacea; dorso superiori cinereo rufoque mixto; vertice, auribus, colli lateribus pectoreque cinereis rufomixtis; lined à naribus pone oculos transiente genisque albis; plumis inter rostrum et oculos gulâque atris; remigibus primariis et secundariis nigrescentibus flavo marginatis: caudâ rectricibus mediis olivaceo-fuscis, tribus externis ferè toto pallide flavis; abdomine medio flavescenti albo, lateribus obscurioribus.*

Long. tot.  $6\frac{1}{2}$  unc.; alæ,  $3\frac{1}{2}$ ; caudæ,  $2\frac{3}{4}$ ; tarsi, 10 lines; rostri, 5 lin.

Adult. Yellowish olive, mixed with grey and rufous on the upper part of the back;



top of the head, ears, sides of the neck and breast, grey mixed with rufous; the lines from the nostrils reaching behind the eyes and cheeks, white; the space between the bill and eye, and the throat, deep black; the primaries and secondaries blackish, margined with yellow; the tail, with the middle feathers, olivaceous black, with the three external nearly wholly pale yellow; the middle of the abdomen yellowish white, with the flanks darker.

Young: Upper surface brownish white, with the middle of each feather black; the throat lighter; the wing coverts and secondaries margined with white and brown; the primaries with yellow; the tail blackish, with their outer margins yellow, and the external feather wholly pale yellow white; beneath the body pale yellowish white, streaked on the breast and flanks with a darker tint.

Habitat, East Falkland Island (*March*), and Santa Cruz, Patagonia (*April*).

This bird is extremely abundant in large scattered flocks in the Falkland Islands.

2. CHLOROSPIZA? XANTHOGRAMMA. *G. R. Gray.*

PLATE XXXIII.

*C. cinerascens olivacea, rufo paulo tincta; lineâ à naribus pone oculos transiente genisque flavis; plumis inter rostrum et oculos gulâque atris; remigibus secundariis nigrescentibus, cinereo et olivaceo latè marginatis; primariis nigrescentibus, flavo angustè marginatis; caudâ cinerascens nigrâ, plumis externis albis; corpore infra flavescenti albo, hypochondriis obscurioribus.*

Long. tot.  $7\frac{3}{8}$  unc.; alæ,  $3\frac{3}{8}$ ; caudæ, 3; tarsi, 1; rostri, 7 lin.

Adult: Greyish olive, very slightly mixed with rufous, a line from the nostrils reaching behind the eyes and cheeks, yellow; the space between the bill and eye, and the entire throat, deep black; the secondaries blackish, broadly margined with grey and olive; the primaries blackish, slightly margined with yellow; the tail greyish black, with the outer feathers white; beneath the body yellowish white, darker on the flanks.

Female: Upper surface brownish white, with each feather blackish brown in the middle, the head and throat paler; the wing-coverts and secondaries blackish, margined with brownish white; the primaries blackish, slightly margined with yellow; the tail blackish white-margined, with the outer feathers nearly wholly white; beneath the body yellowish white, streaked with brown on the breast and flanks; and the space from the nostrils reaching to behind the eyes and cheeks, yellowish.

Habitat, East Falkland Island (*March*), and Tierra del Fuego (*February*).

This species is common at the Falkland Islands, and it often occurs mingled in the same flock with the last one. I suspect, however, it more commonly frequents higher parts of the hills. These species have a very close general resemblance; but the marks about the head, which are white in the *C. melanodera*, are yellow in the *C. xanthogramma*, while the parts of the tail-feathers which are white in the latter, are yellow in the *C. melanodera*: this difference of colours does not hold in the females, but they may be at once distinguished by the greater length of wing, when folded, of the *C. xanthogramma*.

CHRY SOMITRIS MAGELLANICA. *Bonap.*

Fringilla Magellanica, *Vieill. Ency. Meth.* 983; Ois. Chant. de la Zone Torride, pl. 30;

Audubon, Birds of Am. pl. 394, f. 2.

Gafarron, *Azara*, No. 134.

Fringilla icterica, *Licht. Cat.* p. 26.

This bird was very abundant in large flocks during May, at Maldonado; I found it also at the Rio Negro.

SUB-FAMILY.—TANAGRINÆ.

PITYLUS SUPERCILIARIS.

Tanagra superciliaris, *Spix.* Av. Sp. Nov. 2. t. lvii. fig. 1. p. 44.

My specimen was procured from Santa Fé, in Lat. 31° S.

1. AGLAIA STRIATA. *D'Orb. & Lafr.*

PLATE XXXIV.

♂ Tanagra striata, *Gmel. Syst.* 1. 899; *Ency. Meth.* 776; *Licht. Cat.* p. 31. Sp. 347;

*Proc. Zool. Soc.* 1837, p. 121, pl. 34 of this work.

L'Onget, *Buff.* iv. p. 256.

Le Lindoblen, dore et noir, *Azara*, No. 94.

♀ Tanagra Darwinii, *Bonap.*; *Proc. Zool. Soc.* 1837, p. 121.

I saw the only specimen, which I procured, feeding on the fruit of an opuntia at Maldonado.

Mr. G. R. Gray is induced to consider the species figured under the name of *T. Darwinii*, as the *T. striata*, *Gm.* and the *T. Darwinii* of the Zoological Society's Proceedings, as the female of the same species, while the young birds may be described as following:

Brown, with the margins of the dorsal feathers greenish-brown, those of the wings and tail margined brownish-white; head and neck greyish-green;



beneath the body pale dusky green, somewhat darker on the breast and sides; uropygium yellowish-green.

Three specimens of this species are contained in the British Museum, exhibiting male, female, and young.

## 2. AGLAIA VITTATA.

*Tanagra vittata*, Temm. Pl. col.

Maldonado; not common.

PIPILLO PERSONATA. Swains.

PLATE XXXV.

*P. personata*, Swains. Two cent. and a quart. p. 311.

Maldonado; not common. The stomach of one, which I shot, contained seeds.

EMBERIZOIDES POLIOCEPHALUS. G. R. Gray.

*E. olivaceus*, dorsi plumis medio nigro striatis; capite gulâque cinereis, priore plumis singulis, medio nigrostriatis; corpore infra rufescenti albo; hypochondriis tectricibus caudæ inferioribus obscurioribus; alarum margine latè flava, remigibus primariis secundariisque nigris; prioribus pallidè olivaceo, posterioribus olivascente flavo latè marginatis.

Long. tot.  $7\frac{3}{4}$  unc.; alæ,  $3\frac{1}{2}$ ; caudæ, 4; tarsi,  $1\frac{1}{4}$ ; rostri, 8 lin.

Olivaceous, with the feathers of the back marked down the middle with black; the head and throat cinereous, with each feather of the former streaked down the middle with black; beneath the body rufous white, darker on the flanks and under tail coverts; the border of the wings bright yellow; the secondaries and primaries black, the former broadly margined with pale olive, the latter with bright olivaceous yellow; base of bill dusky orange.

Habitat, northern shore of the Plata. (May and August.)

This bird is common both near Monte Video and Maldonado, in swamps. Stomach full of seeds: it makes a shrill loud cry: its flight is clumsy, as if its tail were disjointed.

## FAM.—COCCOTHAUSTINÆ.

GENUS, GEOSPIZA, Gould.

*Corporis figura brevissima et robusta.*

*Rostrum magnum, robustum, validum, altitudine longitudinem præstante; culmine arcuato et capitis verticem superante, apice sine denticulo, lateribus tumidis.*

*Naribus basalibus et semitectis plumis frontalibus.*

*Mandibulâ superiori tomis medium versus sinum exhibentibus, ad mandibulâ inferioris processum recipiendum. Mandibula inferior ad basin lata, hoc infra oculos tendente.*

*Alæ mediocres remige primo paulo brevior secundo, hoc longissimo.*

*Cauda brevissima et æqualis.*

*Tarsi magni et validi, digito postico, cum ungue robusto et digito intermedio brevior; digitis externis inter se æqualibus at digito postico brevioribus. Color in maribus niger, in fœm. fuscus.*

This singular genus\* appears to be confined to the islands of the Galapagos Archipelago. It is very numerous, both in individuals and in species, so that it forms the most striking feature in their ornithology. The characters of the species of *Geospiza*, as well as of the following allied subgenera, run closely into each other in a most remarkable manner.

In my Journal of Researches, p. 475, I have given my reasons for believing that in some cases the separate islands possess their own representatives of the different species, and this almost necessarily would cause a fine gradation in their characters. Unfortunately I did not suspect this fact until it was too late to distinguish the specimens from the different islands of the group; but from the collection made for Captain FitzRoy, I have been able in some small measure to rectify this omission.

In each species of these genera a perfect gradation in colouring might, I think, be formed from one jet black to another pale brown. My observations showed that the former were invariably the males; but Mr. Bynoe, the surgeon of the Beagle, who opened many specimens, assured me that he found two quite black specimens of one of the smaller species of *Geospiza*, which certainly were females: this, however, undoubtedly is an exception to the general fact; and is analogous to those cases, which Mr. Blyth\* has recorded of female linnets and some other birds, in a state of high constitutional vigour, assuming the brighter plumage of the male. The jet black birds, in cases, where there could be no doubt in regard to the species, were in singularly few proportional numbers to the brown ones: I can only account for this by the supposition that the intense black colour is attained only by three-year-old birds. I may here mention, that the time of year (beginning of October) in which my collection was made, probably corresponds, as far as the purposes of incubation are concerned, with our autumn. The several species of *Geospiza* are undistinguishable from each other in habits; they often form, together with the species of the following subgenera, and likewise with doves, large irregular flocks. They frequent the rocky and extremely arid parts of the land sparingly covered with almost naked bushes, near the coasts;

\* This genus, and the following sub-genera, were named by Mr. Gould at a meeting of the Zool. Soc. Jan. 10 1837, p. 4. of Proceedings.

† Remarks on the Plumage of Birds, Charlsworth's Mag. of Nat. History, vol. i. p. 480.



for here they find, by scratching in the cindery soil with their powerful beaks and claws, the seeds of grasses and other plants, which rapidly spring up during the short rainy season, and as rapidly disappear. They often eat small portions of the succulent leaves of the *Opuntia Galapageia*, probably for the sake of the moisture contained in them: in this dry climate the birds suffer much from the want of water, and these finches, as well as others, daily crowd round the small and scanty wells, which are found on some of the islands. I seldom, however, saw these birds in the upper and damp region, which supports a thriving vegetation; excepting on the cleared and cultivated fields near the houses in Charles Island, where, as I was informed by the colonists, they do much injury by digging up roots and seeds from a depth of even six inches.

## 1. GEOSPIZA MAGNIROSTRIS. Gould.

PLATE XXXVI.

*G. fuliginosa, crisso cinerascens-albo; rostro nigro-brunnescente lavato; pedibus nigris.*

Long. tot. 6 unc.; *alæ*,  $3\frac{1}{2}$ ; *caudæ*, 2; *tarsi*, 1; *rostri*,  $\frac{7}{8}$ ; alt. *rost.* 1.

Fœm. vel Mas jun.; *corpore intensè fusco singulis plumis olivaceo cinctis; abdomine pallidiore; crisso cinerascens-albo; pedibus et rostro, ut in mare adulto.*

Sooty black; with the vent cinereous white, the bill black, washed with brownish, and the feet black.

Female, or young male: Deep fuscous, with each feather margined with olive, the abdomen much paler, with the under tail-coverts cinereous white, the feet and bill like those of the male.

Habitat, Galapagos Archipelago. (Charles and Chatham Islands.)

I have strong reasons for believing this species is not found in James's Island. Mr. Gould considers the *G. magnirostris* as the type of the genus.

## 2. GEOSPIZA STRENUA. Gould.

PLATE XXXVII.

*G. fuliginosa, crisso albo, rostro fusco et nigro tincto; pedibus nigris.*

Long. tot.  $5\frac{1}{2}$  unc.; *alæ*, 3; *caudæ*,  $1\frac{3}{4}$ ; *tarsi*,  $\frac{3}{4}$ ; *rostri*,  $\frac{5}{8}$ ; alt. *rost.*  $\frac{3}{8}$ .

Fœm. *Summo corpore fusco singulis plumis alarum caudæque plumis exceptis, pallidè cinerascens-olivaceo cinctis; guld et pectore fuscis; abdomine lateribus et crisso pallidè cinerascens-fuscis; rostro brunnescente.*

Sooty black, with the under tail coverts white; the bill brown, tinged with black, and the feet black.

Female: Upper part of the body fuscous, with the margins of each feather, except those of the wings and tail, pale cinereous-olive; the throat and breast

fuscous: the abdomen, sides, and under tail-coverts pale cinereous-fuscous; the bill brownish.

Habitat, Galapagos Archipelago (James and Chatham Islands.)

## GEOSPIZA FORTIS. Gould.

PLATE XXVIII.

*G. intense fuliginosa, crisso albo; rostro rufescenti-brunneo, tincto nigro; pedibus nigris.*

Fœm. (vel Mas jun.) *Corpore suprâ pectore et gutture intensè fuscis, singulis plumis cinerascens-olivaceo marginatis; abdomine crissoque pallidè cinerascens-brunneis; rostro rufescenti-fusco ad apicem flavescens; pedibus ut in mare.*

Long. tot.  $4\frac{3}{4}$  unc.; *alæ*, 3; *caudæ*,  $1\frac{1}{2}$ ; *tarsi*,  $\frac{11}{16}$ ; *rostri*,  $\frac{7}{16}$ .

Deep sooty black; with the under tail-coverts and the bill reddish brown tinged with black; the feet black.

Female (or young male): The body above, breast and throat, deep fuscous, with each feather margined with cinereous-olive: the abdomen, and under tail-coverts pale cinereous-brown; the bill reddish fuscous, with the apex yellowish, and the feet like those in the male.

Habitat, Galapagos Archipelago, (Charles and Chatham Islands.)

## 4. GEOSPIZA NEBULOSA. Gould.

*G. summo capite et corpore nigrescenti-fuscis; singulis plumis cinerascens-olivaceo marginatis; corpore subtus pallidiore, abdomine imo crissoque cinerascens; rostro et pedibus intensè fuscis.*

Long. tot. 5 unc.; *alæ*,  $2\frac{3}{4}$ ; *caudæ*,  $1\frac{3}{4}$ ; *tarsi*,  $\frac{3}{4}$ ; *rostri*,  $\frac{5}{8}$ ; alt. *rost.*  $\frac{1}{2}$ .

MALE.—Upper part of the head and body blackish fuscous, with each feather margined with cinereous olive; the body beneath paler, with the lowest part of the abdomen and under tail-coverts ashy; the bill and feet deep fuscous.

Habitat, Galapagos Archipelago, (Charles Island.)

## 5. GEOSPIZA FULIGINOSA. Gould.

*G. intense fuliginosa, crisso albo, rostro fusco; pedibus nigrescenti-fuscis.*

Long. tot.  $4\frac{1}{2}$  unc.; *alæ*,  $2\frac{1}{2}$ ; *caudæ*,  $1\frac{3}{4}$ ; *tarsi*,  $\frac{3}{4}$ ; *rostri*,  $1\frac{1}{2}$ ; alt. *rostri*,  $\frac{3}{8}$ .

Fœm. *Summo corpore, alis, caudæque intensè fuscis; singulis plumis cinerascens-ferrugineo marginatis; corpore infra cinereo, singulis plumis medium versus obscurioribus; rostro brunneo; pedibus nigrescenti-brunneis.*

Deep sooty black, with the under tail coverts white; the bill fuscous, and the feet blackish fuscous.



Female: Upper part of the body; the wings and tail deep fuscous, with each feather margined with ashy ferrugineous; beneath the body cinereous, with each feather towards the middle darker; the bill brown, and the feet blackish brown.

Habitat, Galapagos Archipelago. (Chatham and James' Island.)

#### 6. GEOSPIZA DENTIROSTRIS. Gould.

*G.* (Fœm. vel Mas jun.) *mandibulæ superioris margine in dentem producto, vertice corporeque supra fuscis; singulis plumis medium versus obscurioribus; secundariis tectricibusque alarum ad marginem stramineis; gutture et pectore pallidè brunneis, singulis plumis medium versus obscurioribus, imo abdomine crissoque cinerascenti-albis; rostro rufo-fusco; pedibus obscurè plumbeis.*

Long. tot.  $4\frac{3}{4}$  unc.; *alæ*,  $2\frac{3}{8}$ ; *caudæ*,  $1\frac{1}{2}$ ; *rostri*,  $\frac{1}{2}$ ; alt. *rost.*,  $\frac{3}{8}$ .

The margin of the upper mandible produced into a tooth; the vertex and above the body fuscous, with each feather towards the middle darker; the margins of the secondaries and wing coverts straw colour; the throat and breast pale brown, darker towards the middle of each feather; the sides and under tail-coverts cinereous white; the bill rufous fuscous, and the feet obscure lead colour.

Habitat, Galapagos Archipelago.

Mr. Gould considered this specimen a female, from the appearance of its plumage; but from dissection, I thought it was a male.

#### 7. GEOSPIZA PARVULA. Gould.

PLATE XXXIX.

*G.* (Mas) *capite, gutture, et dorso fuliginosis; uropygio cinerascenti-olivaceo; caudæ et alis nigrescenti brunneis; singulis plumis caudæ et alarum, cinereo-marginatis; lateribus olivaceis, fusco guttatis; abdomine et crisso albis, rostro et pedibus nigrescenti-brunneis.*

Long. tot. 4 unc.; *alæ*,  $2\frac{3}{8}$ ; *caudæ*,  $1\frac{1}{2}$ ; *tarsi*,  $\frac{3}{8}$ ; *rostri*,  $\frac{3}{8}$ ; alt. *rost.*,  $\frac{5}{16}$ .

Fœm. *Summo capite et dorso cinerascenti-brunneis, gutture, pectore, abdomine crissoque pallidè cinereis, stramineo tinctis.*

The head, throat, and back, sooty black; the lower part of the back cinereous olive; the tail and wings blackish brown, margined with cinereous; the sides olive with fuscous spots; the abdomen and under tail-coverts white; the bill and feet blackish brown.

Female: The upper surface cinereous brown; the throat, breast, abdomen, and the under tail coverts, pale cinereous tinged with straw colour.

Habitat, Galapagos Archipelago. (James' Island.)

#### 8. GEOSPIZA DUBIA. Gould.

*G.* (Fœm. Mas ignot.) *summo capite et corpore suprâ fuscis, singulis plumis cinerascenti-olivaceo marginatis; strigâ superciliari, genis, gutture, corpore infrâ cinerascenti-olivaceis, singulis plumis notâ centrali fuscâ; alis caudâque brunneis singulis plumis olivaceo-cinereo marginatis; rostro sordidè albo, pedibus obscurè fuscis.*

Long. tot.  $3\frac{3}{8}$  unc.; *alæ*,  $2\frac{3}{4}$ ; *caudæ*,  $1\frac{1}{2}$ ; *tarsi*,  $\frac{7}{8}$ ; *rostri*,  $\frac{5}{8}$ ; alt. *rostri*,  $\frac{3}{8}$ .

Upper surface fuscous, with each feather margined with cinereous olive; the streak above the eye, cheeks, throat, and beneath the body, cinereous olive, with the middle of each feather fuscous; the wings and tail brown, with each feather margined with cinereous ash; the bill white, and the feet obscure fuscous.

Habitat, Galapagos Archipelago, (Chatham Island.)

#### SUB-GENUS.—CAMARHYNCHUS. Gould.

*CAMARHYNCHUS* differt a genere *GEOSPIZA*, *rostro debiliore, margine mandibulæ superioris minùs indentato; culmine minùs elevato in frontem et plus arcuato; lateribus tumidioribus; mandibulâ inferiore minùs in genas tendente.*

*Camarhynchus psittaculus* is the typical species.

#### 1. CAMARHYNCHUS PSITTACULUS. Gould.

PLATE XL.

*C.* (Fœm.) *summo capite corporeque superiore fuscis; alis caudâque obscurioribus; gutture corporeque inferiore, cinerascenti-albis, stramineo tinctis; rostro pallidè flavescenti-fusco; pedibus fuscis.*

Long. tot.  $4\frac{3}{4}$  unc.; *alæ*,  $2\frac{3}{4}$ ; *caudæ*,  $1\frac{1}{2}$ ; *tarsi*,  $\frac{7}{8}$ ; *rostri*,  $\frac{1}{2}$ ; alt. *rostri*,  $\frac{1}{2}$ .

The upper part of the head and body fuscous; the wing and tail darker; the throat, and beneath the body cinereous white, tinged with straw-colour; the bill pale yellowish fuscous, and the feet fuscous.

Habitat, Galapagos Archipelago, (James' Island.)

The species of *Camarhynchus* do not differ in habits from those of *Geospiza*; and the *C. psittaculus* might often be seen mingled in considerable numbers in the same flock with the latter. Mr. Bynoe procured a blackish specimen, which, doubtless, was an old male; I saw several somewhat dusky, especially about the head.

#### 2. CAMARHYNCHUS CRASSIROSTRIS. Gould.

PLATE XLI.

*C.* (Mas jun. et Fœm.) *corpore superiore intensè brunneo, singulis plumis cinerascenti-*



*olivaceo marginatis; gutture pectoreque cinerascanti-olivaceis, singulis in medio plumis obscurioribus; abdomine, lateribus crissoque cinereis stramineo tinctis.*

Long. tot.  $5\frac{1}{2}$  unc.; *alæ*,  $3\frac{3}{4}$ ; *caudæ*, 2; *tarsi*,  $1\frac{1}{8}$ ; *rostri*,  $\frac{1}{2}$ ; alt. *rostri*,  $\frac{1}{4}$ .

Upper part of the body deep brown, with each feather margined with cinereous olive; the throat and breast cinereous olive, with the middle of each feather darker; the abdomen, sides, and under tail coverts cinereous tinged with straw colour.

Habitat, Galapagos Archipelago, (Charles Island?)

I am nearly certain that this species is not found in James Island. I believe it came from Charles Island, and probably there replaces the *C. psittaculus* of James Island. I obtained three specimens, one male, and two females; from the analogy of so many species in this group, I do not doubt the old male would be black.

SUB-GENUS.—CACTORNIS. Gould.

CACTORNIS differt a genere GEOSPIZA rostro elongato, acuto, compresso, longitudine altitudinem eccellente; mandibulæ superioris margine vix indentato; naribus basalibus et vix tectis; tarsis brevioribus, unguibus majoribus et plus curvatis.

*Cactornis scandens* is the typical species.

1. CACTORNIS SCANDENS. Gould.

PLATE XLII.

*C. intensè fuliginosa, crisso albo; rostro et pedibus nigrescenti-brunneis.*

Long. tot. 5 unc.; *rostri*,  $\frac{3}{4}$ ; *alæ*,  $2\frac{5}{8}$ ; *caudæ*,  $1\frac{3}{4}$ ; *tarsi*,  $\frac{3}{4}$ .

Fœm. *Corpore superiore, gutture pectoreque intensè brunneis, singulis plumis pallidiorè marginatis; abdomine crissoque cinereis, stramineo tinctis; rostro pallidè fusco; pedibus nigrescenti-fuscis.*

Deep sooty black, with the under tail-coverts white; the bill and feet blackish-brown.

Female: Upper surface of the body, throat and breast intensely brown, with the margins of each feather paler; the abdomen and the under tail coverts cinereous, tinged with straw-colour; the bill pale fuscous, and the feet blackish fuscous.

Habitat, Galapagos Archipelago, (James' Island.)

The species of this sub-genus alone can be distinguished in habits from the several foregoing ones belonging to *Geospiza* and *Camarhynchus*. Their most

frequent resort is the *Opuntia Galapageia*, about the fleshy leaves of which they hop and climb, even with their back downwards, whilst feeding with their sharp beaks, both on the fruit and flowers. Often, however, they alight on the ground, and mingled with the flock of the above mentioned species, they search for seeds in the parched volcanic soil. The extreme scarceness of the jet-black specimens, which I mentioned under the head of the genus *Geospiza*, is well exemplified in the case of the *C. scandens*, for although I daily saw many brown-coloured ones, (and two collectors were looking out for them), only one, besides that which is figured, was procured, and I did not see a second.

2. CACTORNIS ASSIMILIS. Gould.

PLATE XLIII.

TISSERIN DES GALLAPAGOS, (île St. Charles,) *Neboux*, Revue Zoologique, 1840, p. 291.

*C. Mas* (jun?) *corpore suprâ fuliginoso, (gutturæ abdomineque exceptis,) cinereo marginatis; rostro pallidè rufescenti-brunneo; pedibus nigrescenti-brunneis.*

Long. tot.  $5\frac{1}{2}$  unc.; *rostri*,  $\frac{3}{4}$ ; *alæ*,  $2\frac{3}{4}$ ; *caudæ*,  $1\frac{3}{4}$ ; *tarsi*,  $\frac{3}{4}$ .

Upper surface of the body sooty black, margined with cinereous, as well as the throat and abdomen; the bill pale rufous brown; the feet blackish brown.

Habitat, Galapagos Archipelago.

I do not know from which island of the group this species was procured; almost certainly not from James Island. Analogy would in this case, as in that of *Camarhynchus crassirostris*, lead to the belief that the old male would be jet black. By a mistake this bird has been figured standing on the *Opuntia Darwinii*, a plant from Patagonia, instead of the *O. Galapageia*. I may here mention that a third and well characterized species of *Cactornis* has lately been sent by Captain Belcher, R.N. to the Zoological Society; as Capt. Belcher visited Cocos Island, which is the nearest land to the Galapagos Archipelago, being less than 400 miles distant, it is very probable that the species came thence.

SUB-GENUS.—CERTHIDEA. Gould.

CERTHIDEA differt a genere GEOSPIZA rostro graciliore et acutiore; naribus basalibus et non tectis; mandibulæ superioris margine recto; tarsis longioribus et gracilioribus.

Of the foregoing sub-genera, *Geospiza*, *Camarhynchus* and *Cactornis* belong to one type, but with regard to *Certhidea*, although Mr. Gould confidently believes it should also be referred to the same division, yet as in its slighter form and weaker bill, it has so much the appearance of a member of the *Sylviadæ*, he would by no means insist upon the above view being adopted, until the matter shall have been more fully investigated.



CERTHIDEA OLIVACEA. *Gould.*

## PLATE XLIV.

*C. summo capite, corpore superiore, alis caudâque olivaceo-brunneis; gutture et corpore infra cinereis; rostro pedibusque pallide brunneis.*

Long. tot. 4 unc.; rostri,  $\frac{1}{2}$ ; alæ, 2; caudæ,  $1\frac{1}{2}$ ; tarsi,  $\frac{3}{4}$ .

Upper part of the head, body, wings and tail, olivaceous brown; the throat, and beneath the body, cinereous; the bill and feet pale brown.

Habitat, Galapagos Archipelago. (Chatham and James Island).

I believe my specimens, which include both sexes, were procured from Chatham and James Islands; it is certainly found at the latter.

PHYTOTOMA RARA. *Mol.*

*P. Bloxami*, *Children*, Jard. and Selby's Ill.

*P. rutila*, *Vieill.* Mag. de Zool. 1832, ii. pl. 5.

*P. silens*, *Kittl.* Mem. de l'Acad. des Sci. de St. Petersb.

This is not a very uncommon bird in Central Chile: the farmers complain that it is very destructive to the buds of fruit trees. It is quiet and solitary, and haunts hedge-rows or bushes; its manners are similar to those of our bullfinch, (*Loxia Pyrrhula*). Iris bright scarlet. Mr. Eyton has given an anatomical description of this bird in the Appendix.

DOLICHONYX ORYZIVORUS. *Swains.*

*Dolichonyx oryzivorus*, *Swains.* Faun. Bor. Am. 2. 278.

*Emberiza oryzivorus*, *Linn.*

This one specimen only was seen at James Island, in the Galapagos Archipelago, during the beginning of October. It is remarkable that a bird migrating, according to Richardson, as far as 54° N. in North America, and generally inhabiting marshy grounds, should be found on these dry rocky islands under the equator. Mr. Gray and myself carefully compared this specimen with one from North America, and we could not perceive the slightest difference.

1. XANTHORNUS CHRYSOPTERUS. *G. R. Gray.*

*Oriolus cayennensis*, *Linn.* Syst. 1. 168?

*Agelaius chrysopterus*, *Vieill.*

*Psarocolius chrysopterus*, *Wagl.* Syst. Av. p.

This bird generally frequents marshy grounds. I procured specimens from La Plata and from Chile; in the latter country it extends at least as far north as the valley of Copiapo, in 27° 20': on the eastern plains it does not range, according to Azara, north of 28°. It builds in reeds. Molina says it is called by the Indians Thili, or Chile—hence he derives the name of the country.

2. XANTHORNUS FLAVUS. *G. R. Gray.*

## PLATE XLV.

*Oriolus flavus*, *Gmel.*

*Psarocolius flaviceps*, *Wagl.* Syst. Avium.

Troupiale à tête jaune, *Azara*, No. 66.

This species is common at Maldonado in large flocks.

LEISTES ANTICUS. *G. R. Gray.*

*Icterus anticus*, *Licht.* Cat. p. 19.

*Agelaius virescens*, *Vieill.* Ency. Meth. 543.

*Psarocolius anticus*, *Wagl.*

Le Dragon, *Azara*, No. 65.

This bird is exceedingly abundant in large flocks on the grassy plains of La Plata. It is noisy, and in its habits resembles our starling.

1. AGELAIUS FRINGILLARIUS. *G. R. Gray.*

*Icterus fringillarius*, *Spiz.* Av. Sp. No. 1. t. lxx. fig. 1 & 2. p. 68.

*Psarocolius sericeus*, juv., *Wagl.*

This species is rare at Maldonado, but appears more common on the banks of Parana in Lat. 31° S. Spix says (vol. i. p. 68, Birds of Brazil), it is found in Minas Geraes.

2. AGELAIUS CHOPI. *Vieill.*

*Turdus curæus*, *Gmel.*

Le Chopi, *Azara*, No. 62.

*Icterus unicolor*, *Licht.*

*Icterus sulcirostris*, *Spiz.* Av. Br. pl. 64. f. 2.

This species is common in flocks on the pasture grounds of Chile, and along the whole western shore of the southern part of the continent. In Chile it is called, according to Molina, "cureu." It is a noisy, chattering bird, and runs in the manner of our starlings. It can be taught to speak, and is sometimes kept in cages. It builds in bushes.

MOLOTHRUS NIGER. *Gould.*

*Tanagra bonariensis*, *Gmel.*

*Icterus niger*, *Dand.*

*Passerina discolor*, *Vieill.*

*Icterus maxillaris*, *D'Orb. & Lafr.*

*Icterus sericeus*, *Licht.*

*Psarocolius sericeus*, *Wagl.*

This Molothrus is common in large flocks on the grassy plains of La Plata, and is often mingled with the *Leistes anticus*, and other birds. In the same flock



with the usual black kind, there were generally a few dull brown coloured ones, (*Icterus sericeus* of *Licht.*) which I presume are the young. Azara states that the brown-coloured birds are smaller than the black glossy ones, and that they sometimes form one-tenth of the whole number in a flock. In the single specimen which I brought home, the size, with the exception of the length of the wing, is only a very little less. Sonnini, in his notes to Azara, considers the brown birds as the females; I can, however, scarcely believe that so obvious a solution of the difficulty could have escaped so accurate an observer as Azara. These birds in La Plata often may be seen standing on the back of a cow or horse. While perched on a hedge, and pluming themselves in the sun, they sometimes attempt to sing or rather to hiss: the noise is very peculiar; it resembles that of bubbles of air passing rapidly from a small orifice under water, so as to produce an acute sound. Azara states that this bird, like the cuckoo, deposits its eggs in other birds' nests. I was several times told by the country people, that there was some bird which had this habit; and my assistant in collecting, who is a very accurate person, found in the nest of the *Zonotrichia ruficollis* (a bird which occupies in the ornithology of S. America the place of the common sparrow of Europe), one egg larger than the others, and of a different colour and shape. This egg is rather less than that of the missel-thrush, being .93 of an inch in length, and .78 in breadth; it is of a bulky form, thick in the middle. The ground colour is a pale pinkish-white, with irregular spots and blotches of a bright reddish-brown, and others less distinct of a greyish hue. This species is evidently a very close analogue of the *M. pecoris* of North America, from which, however it may at once be distinguished by the absence of the glossy brown on the head, neck, and upper breast,—by the metallic blueness of its plumage in the place of a green tinge, and by its somewhat greater size in all its proportions. The young or brown-coloured specimens of these *Molothri* resemble each other more closely; that of the *M. pecoris* is of a lighter brown, especially under the throat, and the small feathers on its breast and abdomen have each an obscure dark central streak. The eggs of the *Molothri*, although having the same general character, differ considerably; that of the *M. pecoris* being smaller and less swollen in the middle; it is .85 of an inch in length, and .78 in breadth. Its colour cannot be better described than in the words of Dr. Richardson\*—"of a greenish white, with rather small crowded and confluent irregular spots of pale liver-brown, intermixed with others of subdued purplish grey." From this

\* Fauna Borealis, Birds, p. 278. Dr. Richardson states that the egg is only seven lines and a half in length. I presume the measure of eight lines, instead of twelve to the inch, must in this case have been used. I am much indebted to the kindness of Mr. Yarrell for lending me an egg of the *Molothrus pecoris*, forming part of a collection of North American eggs in his possession.

description it is obvious that the egg of *M. niger* is larger and of a much redder tint; the more prominent spots also are larger, the subdued grey being quite similar in both.

If we were to judge from habits alone, the specific difference between these two species of *Molothrus* might well be doubted; they seem closely to resemble each other in general habits,—in manner of feeding,—in associating in the same flock with other birds, and even in such peculiarities as often alighting on the backs of cattle. The *M. pecoris*, like the *M. niger*, utters strange noises, which Wilson\* describes "as a low spluttering note as if proceeding from the belly." It appears to me very interesting thus to find so close an agreement in structure, and in habits, between allied species coming from opposite parts of a great continent. Mr. Swainson† has remarked that with the exception of the *Molothrus*, the cuckoos are the only birds which can be called truly parasitical; namely, such as "fasten themselves, as it were, on another living animal, whose animal heat brings their young into life, whose food they alone live upon, and whose death would cause theirs during the period of infancy." It is very remarkable, that the cuckoos and the *Molothri*, although opposed to each other in almost every habit, should agree in this strange one of their parasitical propagation: the habit moreover is not universal in the species of either tribe. The *Molothrus*, like our starling, is eminently sociable, and lives on the open plains without art or disguise;‡ the cuckoo, as every one knows, is a singularly shy bird; it frequents the most retired thickets, and feeds on fruit and caterpillars.§

AMBLYRAMPHUS RUBER. *G. R. Gray.*

Oriolus ruber, *Gmel.*

Amblyramphus bicolor, *Leach.*

Sturnus pyrrhocephalus, *Licht.*

Sturnella rubra, *Vieill.*

Leistes erythrocephala, *Swains.* Class. Birds.

This bird frequented marshy places in the neighbourhood of Maldonado, but it was not common there. It is more solitary than the following allied species; I have, however, seen it in a flock. Seated on a twig, with its beak widely open, it often makes a shrill, but plaintive and agreeable cry, which is sometimes single

\* Wilson's American Ornithology, vol. ii. p. 162.

† Magazine of Zoology and Botany, vol. i. p. 217.

‡ See Azara, vol. iii. p. 170.

§ It appears that the eggs in the same nest with that of the *Molothrus pecoris*, are turned out by the parent birds before they are hatched, owing to the egg of the *M. pecoris* being hatched in an unusually short time; in the case of the young cuckoo, as is well known, the young bird itself throws out its foster-brothers. Mr. C. Fox, however, (Silliman's American Journal, vol. xxix. p. 292), relates an instance of three young sparrows having been found alive with a *Molothrus*.



and sometimes reiterated. Its flight is heavy. The young have their heads and thighs merely mottled with scarlet.

*STURNELLA MILITARIS.* Vieill.

*Sturnus militaris, Gmel.*

Etourneau des terres Magellanique, Pl. enl. 113.

I met with specimens of this bird on the east coast of the continent from the Falkland Islands to 31° S., and on the western coast from the Strait of Magellan to Lima, a space of forty degrees of latitude.

FAMILY.—TROCHILIDÆ.

1. *TROCHILUS FLAVIFRONS.*

Monte Video.—November. Not abundant.

2. *TROCHILUS FORFICATUS.* Lath.

Edwards' Gleanings.

Vieill. Ois. dores, t. 1.

Ornismya Kingii, Less. Trochilidees, pl. 38.

This species is found over a space of 2,500 miles on the west coast, from the hot dry country of Lima to the forests of Terra del Fuego, where it has been described by Captain King as flitting about in a snow-storm. In the wooded island of Chiloe, which has an extremely damp climate, this little bird, skipping from side to side amidst the humid foliage, and uttering its acute chirp, is perhaps more abundant than any other kind. It there very commonly frequents open marshy ground, where a kind of bromelia grows: hovering near the edge of the thick beds, it every now and then dashes in close to the ground; but I could not see whether it ever actually alighted. At that time of the year there were very few flowers, and none whatever near the beds of bromelia. Hence, I was quite sure that they did not live on honey; and on opening the stomach and upper intestine, by the aid of a lens, I could plainly distinguish in a yellow fluid, morsels of the wings of diptera,—probably Tipulidæ. It is evident that these birds search for minute insects in their winter quarters under the thick foliage. I opened the stomachs of several specimens which were shot in different parts of the continent, and in all remains of insects were numerous, forming a black comminuted mass. In one killed at Valparaiso, I found portions of an ant. Amongst the Chonos Islands, at a season when there were flowers in open places, yet the damp recesses of the forests appeared their favourite haunt. In central

Chile these birds are migratory; they make their appearance there in autumn; the first arrival which I observed was on the 14th of April (corresponding to our October) but by the 20th they were numerous. They stay throughout the winter, and begin to disappear in September: on October 12th, in the course of a long walk, I saw only one individual. During the period of their summer migration, nests were very common in Chiloe and the Chonos Island, countries south of Chile. When this species of *Trochilus* migrates southward, it is replaced in Chile by a larger kind, which will be presently described. The migration of the humming birds on both the east\* and west coasts of North America, exactly corresponds to that which takes place in the southern half of the continent. In both they move towards the tropic during the colder parts of the year, and retreat poleward before the returning heat. Some, however, remain during the whole year in Tierra del Fuego; and in northern California,—which in the northern hemisphere, has this same relative position which Tierra del Fuego has in the southern,—some, according to Beechey, likewise remain. Near the south end of Chiloe, I found on the 8th of December, a nest with eggs nearly hatched. It was of the ordinary form of nests; rather more than an inch in internal diameter, and not deep, composed externally of coarse and fine moss, neatly woven together, and lined with dried confervæ, now forming a very fine reddish fibrous mass. I feel no doubt regarding the nature of this latter substance, as the transverse septa are yet quite distinct: hence this humming bird builds its nest entirely of cryptogamic plants. Egg perfectly white, elongated, or rather almost cylindrical, with rounded ends; length .557 of an inch, and transverse diameter .352 of an inch. In January, at the Chonos Islands, when there were young in the nest, a considerable number of old birds were shot; of these, however, few or scarcely any had the shining crest of the male. In the only specimen, which I carefully examined, the metallic tips of the young feathers of the crest, were just beginning to protrude. Several of these males without their crest, had a yellowish gorge; and I saw some with a few light brown feathers on their backs. I presume these appearances are connected with their state of moult.

3. *TROCHILUS GIGAS,* Vieill.

Orsimya tristis, Less., Oiseaux Mouches, pl. 3.

This species is common in central Chile. It is a large bird for the delicate family to which it belongs. At Valparaiso, in the year 1834, I saw several of these birds in the middle of August, and I was informed they had only lately arrived from the parched deserts of the north. Towards the middle of September

\* Humboldt, Pers. Narr. vol. v. part 1. p. 352. Cook's Third Voyage, vol. ii. and Beechey's Voyage.



(the vernal equinox) their numbers were greatly increased. They breed in central Chile, and replace, as I have before said, the foregoing species, which migrates southward for the same purpose. The nest is deep in proportion to its width; externally three inches and a half deep; internal depth a little under one inch and three quarters; width within one inch and two-tenths; mouth slightly contracted. Externally it is formed of fine fibrous grass woven together, and attached by one side and bottom to some thin upright twigs; internally it is thickly lined with a felt, formed of the pappus of some composite flower. When on the wing, the appearance of this bird is singular. Like others of the genus, it moves from place to place, with a rapidity which may be compared to that of *Syrphus* amongst diptera, and *Sphinx* among moths; but whilst hovering over a flower, it flaps its wings with a very slow and powerful movement, totally different from that vibratory one common to most of the species, which produces the humming noise. I never saw any other bird, where the force of its wings appeared (as in a butterfly) so powerful in proportion to the weight of its body. When hovering by a flower, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position. This action appears to steady and support the bird, between the slow movements of its wings. Although flying from flower to flower in search of food, its stomach generally contained abundant remains of insects, which, I suspect, are much more the object of its search than honey is. The note of this species, like that of nearly the whole family, is extremely shrill.

In the Appendix an anatomical description of this bird by Mr. Eyton is given.

#### ORDER—SCANSORES.

##### 1. CONURUS MURINUS, *Kuhl.*

*Psittacus murinus*, *Gmel.*

*Perruche*, *Pernet*, voy. 1. p. 312.

This parrot feeds in large flocks on the grassy plains of Banda Oriental, where not a tree can be seen. They are very destructive to the corn-fields. I was assured that in one year, near Colonia del Sacramento, on the north bank of the Plata, 2,500 were killed, a reward being given for each dozen heads. Many of these birds build their nests close together in trees, the whole composing a vast mass of sticks. I saw several of their compound nests on the islands in the river Parana.

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##### 2. CONURUS PATACHONICUS.

*Psittacus Patagonus*, *Vieill.* Ency. Meth. p.

*Psittacara Patagonica*, *Less.* Voy. de la Coquille Zool. pl. 35 bis.

*Psittacara Patachonica*, *Lear's* Ill. Psitt.

*Le Patagon*, *Azara*, No. 277.

*Patagonian maccaw*, *Lath.* Hist. 11, 105.

I obtained specimens of this bird at Bahia Blanca in Northern Patagonia, where there is not a single tree, and the country is dry and very sterile. I did not meet with this species in the southern parts of Patagonia, but it is common near Concepcion in Chile, in nearly the same latitude. They build their nests in holes in cliffs of earth or gravel, together with the *Hirundo cyanoleuca*. In September, at Bahia Blanca, they were laying: their eggs are quite white, and small in proportion to the bird. Several usually rush forth from their holes at the same instant, and utter a noisy scream.

##### PICUS KINGII. *G. R. Gray.*

*Picus melanocephalus*, *King*, Proc. Zool. Soc. 1830, p. 14.

I procured specimens at Valparaiso, and at the Peninsula of Tres Montes (Lat. 46° S.) At the latter place, I killed in January a pair, male and female. Captain King's specimens were obtained from Chiloe. The male has its whole head scarlet with only the nape black, so that Captain King's specific name is unfortunately not applicable for the species; therefore Mr. G. R. Gray thinks it should be named after the first describer. The head of the female is black, with some short reddish-brown feathers over nostrils. There appears to be no other difference in the plumage of the sexes.

##### CHRYSOPTILUS CAMPESTRIS. *Swains.*

*Picus campestris*, *Licht.* Cat. p. *Spix*, Av. Br. pl. 116.

*Le charpentier des champs*, *Azara*, No. 253.

My specimens were obtained from Banda Oriental and Buenos Ayres; I saw it no further southward. *Spix* says (*Birds of Brazil*. vol. i. p. 51.) it inhabits Minas Geraes. They frequent open plains and especially rocky ground. They are rather wild, and generally live three or four together. The tail of these ground woodpeckers seems but little used; their beaks, however, were generally muddy to the base: in the stomach of one I found only ants. Their flight is undulatory like that of the English woodpecker, and their loud cry is likewise similar, but

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each note more separate. They alight on the branch of a tree, horizontally, in the manner of ordinary birds; but occasionally I have seen one clinging in an upright position to a post. They appear to feed exclusively on the ground.

COLAPTES CHILENSIS. *Vigors.*

*Picus chilensis*, *Garnot*, *Voy. de la Coquille*, *Zool.* pl. 52.

This bird frequents the dry stony hills of central Chile, on which only a few bushes and trees grow. It is closely related in habits and structure to the foregoing species, and appears to be its representative on the western side of the Cordillera; hence I cannot but think the institution of the above two genera unfortunate. It is the "*Pitui*" of Molina, which name, I imagine, it derives from its peculiar cry. Molina states, that it builds its nest in holes in banks.

1. DIPLOPTERUS NÆVIUS. *Boie.*

*Cuculus nævius*, *Lath.* *Ind.* 220.

Rio de Janeiro. April.

2. DIPLOPTERUS GUIRA. *G. R. Gray.*

*Cuculus guira*, *Linn.*

*Crotophaga pirigua*, *Vieil.* *Gal. des Ois.* pl. 44.

*Ptiloleptus cristatus*, *Swains.*

Buenos Ayres. In small flocks; a noisy, chattering bird.

CROTOPHAGA ANI. *Linn.*

*Petit Bout-de-Petun*, pl. enl. 102. f. 2.

Rio de Janeiro. May. The stomach of several specimens contained remains of numerous Orthopterous, and some Coleopterous insects.

ORDER GYRATONES. *Bonap.*

1. COLUMBA FITZROYII. *King.*

*Columba fitzroyii*, *King.*, in *Proc. of Zool. Soc.* part 1, 1830, p. 14.

*Columba denisea*, *Temm.* pl. col. 502.

*Columba araucana*, *Less.* *Voy. de Coqu.* pl. 40.?

Peninsula of Tres Montes. Lat. 46° S. January. Captain King's specimens were obtained at Chiloe, three degrees northward. I procured other specimens near Valparaiso. This bird therefore frequents dry rocky land, and damp impervious forests.

2. COLUMBA LORICATA. *Licht. Vög. Verz.* s. 67.

*Columba gymnophthalmus*, *Temm.*, *Fig.* i. 18.

——— *leucoptera*, *Pr. Max. Reise*, 2, p. 242.

——— *picazuro*, *Temm.* *Fig.* p. 111.

*Picazuro*, *Azara*, *Voy.* No. 317.

Frequents in large flocks the fields of Indian corn in the neighbourhood of Maldonado. Legs dull "carmine red." This, probably, is the representative on the eastern side of the Andes of the foregoing or Chilean species.

1. ZENAIDA AURITA. *G. R. Gray.*

*Columba aurita*, *Temm.* *Fig.* p. 60. *Wagl.* sp. 70.

I procured specimens of this bird at Maldonado (where it was very abundant) in La Plata, and at Valparaiso in Chile.

2. ZENAIDA GALAPAGOENSIS. *Gould.*

PLATE XLVI.

*Z. vertice, cervice, dorso caudæque tegminibus obscure fuscis vinaceo-tinctis; dorso nigro-guttato; alarum tegminibus fuscis, plumâ singulâ pallidè vinaceo-fusco terminatâ, pogonii utriusque margine, maculâ oblongâ magnâ nigrâ, lineâ albâ separatâ; remigibus primariis et secundariis nigrescenti-fuscis, cinerascenti-albo angustè marginatis; caudâ fuscescenti cinereo ad apicem fasciâ latâ irregulari nigra; loris lineâque angustâ supra et infra oculari nigris pallidè fusco mixtis; gulâ pectoreque vinaceis, colli lateribus ærato tinctis; crisso, caudæque tegminibus inferioribus cinerascentibus, rostro nigro, pedibus rufescenti aurantiacis.*

Long. tot. 8½ unc.; alæ, 5½; caudæ, 3½; tarsi, ¾; rostri, 1.

Crown of the head and back of the neck, dark chocolate brown, with a vinous tinge; back and tail-coverts the same, the former spotted with black; wing-coverts brown, each feather having a large oblong spot of black on the margin of either web, separated by a line of white, and tipped with light vinous brown, the white predominating on the larger coverts, primaries and secondaries blackish-brown, finely edged with greyish-white; tail brownish-grey, crossed near the extremity with a broad irregular band of black; lores and a narrow line above and beneath the eye black, interrupted with light brown: throat and chest rich vinous, glossed on the sides of the neck with metallic bronze, and fading into greyish on the vent and under tail-coverts; bill black; feet reddish-orange.



Habitat, Galapagos Archipelago. (Sept. and Oct.)

This species may at once be distinguished from the *Z. aurita*, by the redder tint of its breast,—the greater number of black marks on the wing coverts and back—the outer half of some of the feathers on the wing coverts being white—the marks on the under side of the tail being grey (instead of white as in the *Z. aurita*) and by the larger size of its beak.

This dove is one of the most abundant birds in the Archipelago. It frequents the dry rocky soil of the low country, and often feeds in the same flock with the several species of *Geospiza*. It is exceedingly tame, and may be killed in numbers. Formerly it appears to have been much tamer than at present. Cowley,\* in 1684, says that the "Turtle doves were so tame that they would often alight upon our hats and arms, so as that we could take them alive: they not fearing man, until such time as some of our company did fire at them, whereby they were rendered more shy." Dampier† (in the same year) also says that a man in a morning's walk might kill six or seven dozen of these birds. At the present time, although certainly very tame, they do not alight on people's arms; nor do they suffer themselves to be killed in such numbers. It is surprising that the change has not been greater;—for these islands during the last hundred and fifty years, have been frequented by buccaneers and whalers; and the sailors, wandering through the woods in search of tortoises, take delight in knocking down the little birds.

### 3. ZENAIIDA BOLIVIANA. *G. R. Gray.*

*Columba Boliviana*, *D'Orb. & Laftr. Mag. de Zool.* 1836. Ois. p. 33. pl. 75.

My specimen was obtained (end of August) at Valparaiso.

#### 1. COLUMBINA STREPITANS. *Spix.*

(*Av. pl.* 75, f. 1.)

I procured specimens at Maldonado (where it was not common), on the banks of the Plata, and at Rio Negro, in Northern Patagonia.

#### 2. COLUMBINA TALPACOTI. *G. R. Gray.*

*Columba Talpacoti*, *Temm. Fig.* p. 22. t. 12.

*Columbina Cabocolo*, *Spix*, *Av. pl.* 75a. f. 1.

*Le Pigeon rougeatre*, *Azara*, No. 323.

My specimens were obtained at Rio de Janeiro.

\* Cowley's Voyage, p. 10, in Dampier's Collection of Voyages.

† Dampier's Voyage, vol. i. p. 103. For some further observations on the tameness of the birds on this and some other islands, see my Journal of Researches, p. 475.

### 1. ATTAGIS FALKLANDICA. *G. R. Gray.*

*Tetrao Falklandicus*, *Gmelin*, *Syst.* 1. 762.

*La Caille des Isles Malouines*, *Buff.* pl. enl. 222.

*Coturnix Falklandica*, *Bonn. Ency. Meth. Orn.* 220.

*Perdix Falklandica*, *Lath.* *Ind. Orn.* 11, 632.

*Ortyx Falklandica*, *Steph.* *Shaw's Zool.* xi. 386.

This bird is not uncommon on the mountains in the extreme southern parts of Tierra del Fuego. It frequents, either in pairs or small coveys, the zone of alpine plants above the region of forest. It is not very wild, and lies very close on the bare ground.

### 2. ATTAGIS GAYII. *Less.*

*Attagis Gayii*, *Less.* *Cent. Zool.* pl. 47, p. 155.

A specimen was given me, which was shot on the lofty Cordillera of Coquimbo, only a little below the snow-line. At a similar height, on the Andes, behind Copiapo, which appear so entirely destitute of vegetation, that any one would have thought that no living creature could have found subsistence there, I saw a covey. Five birds rose together, and uttered noisy cries; they flew like grouse, and were very wild. I was told that this species never descends to the lower Cordillera. These two species, in their respective countries, occupy the place of the ptarmigan of the northern hemisphere.

### TINOCHORUS RUMICIVORUS. *Eschsch.*

*Thinocorus rumicivorus*, *Eschsch.* *Zool. Atl.* pl. 2.

*Thinocorus Eschscholtzii*, *Less.* *Cent. Zool.* pl. 50.

This very singular bird, which in its habits and appearance partakes of the character both of a wader and one of the gallinaceous order, is found wherever there are sterile plains, or open dry pasture land, in southern South America. We saw it as far south as the inland plains of Patagonia at Santa Cruz, in lat. 50°. On the western side of the Cordillera, near Concepcion, where the forest land changes into an open country, I saw this bird, but did not procure a specimen of it: from that point throughout Chile, as far as Copiapo, it frequents the most desolate places, where scarcely another living creature can exist: it thus ranges over at least twenty-three degrees of latitude. It is found either in pairs or in small flocks of five or six; but near the Sierra Ventana I saw as many as thirty and forty together. Upon being approached they lie close, and then are very difficult to be distinguished from the ground; so that they often rise quite unexpectedly. When feeding they walk rather slowly, with their legs wide apart. They dust themselves in roads and sandy places. They frequent particular spots, and may



be found there day after day. When a pair are together, if one is shot, the other seldom rises; for these birds, like partridges, only take wing in a flock. In all these respects, in the muscular gizzard adapted for vegetable food, in the arched beak and fleshy nostrils, short legs, and form of foot, the *Tinochorus* has a close affinity with quails. But directly the bird is seen flying, one's opinion is changed; the long pointed wings, so different from those in the gallinaceous order, the high irregular flight, and plaintive cry uttered at the moment of rising, recall the idea of a snipe. Occasionally they soar like partridges when on the wing in a flock. The sportsmen of the Beagle unanimously called it the short-billed snipe. To this genus, or rather to that of the sandpiper, it approaches, as Mr. Gould informs me, in the shape of its wing, the length of the scapulars, the form of the tail, which closely resembles that of *Tringa hypoleucos*, and in the general colour of the plumage. The male bird, however, has a black mark on its breast, in the form of a yoke, which may be compared to the red horseshoe on the breast of the English partridge. Its nest is said to be placed on the borders of lakes, although the bird itself is an inhabitant of the parched desert. I was told that the female lays five or six white eggs, spotted with red. I opened the stomachs of many specimens at Maldonado, and found only vegetable matter, which consisted of chopped pieces of a thick rushy grass, and leaves of some plant, mixed with grains of quartz. The contents of the intestine and the dung were of a very bright green colour. At another season of the year, and further south, I found the craw of one full of small seeds and a single ant. Those which I shot were exceedingly fat, and had a strong offensive game odour; but they are said to be very good eating, when cooked. Pointers will stand to them. In the Appendix Mr. Eyton has given an anatomical description of this bird, which partly confirms that affinity both to the *Grallatores* and *Razores*, which is so remarkable in its habits and external appearance.

*CHIONIS ALBA. Forst.*

*Shaw's Nat. Miscel. pl. 481.*

I opened the stomach of a specimen killed at the Falkland Islands, and found in it small shells, chiefly *Patellæ*, pieces of sea-weed, and several pebbles. The contents of the stomach and body smelt most offensively. Forster remarked this circumstance; but since his time, other observers, namely, Anderson, Quoy, Gaimard, and Lesson (*Manuel d'Ornithologie*, tom ii, p. 342) have found that this is not always the case, and they state that they have actually eaten the *Chionis*. I was not aware of these observations, but independently was much surprised at the extraordinary odour exhaled. We, like other voyagers in the Antarctic seas, were struck at the great distance from land, at which this bird is found in the

open ocean. Its feet are not webbed, its flight is not like that of other pelagic birds, and the contents of its stomach, and structure of legs, show that it is a coast-feeder. Does it frequent the floating icebergs of the Antarctic ocean, on which sea-weed and other refuse is sometimes cast?

1. *NOTHURA MAJOR. Wagl.*

*Nothura major, Wagl. Syst. Av. p. sp. 4.*

*Tinamus major, Spix. Av. pl. 80.*

These birds are very common on the northern shores of the Plata. They do not rise in coveys, but generally by pairs. They do not conceal themselves nearly so closely as the English partridge, and hence great numbers may be seen in riding across the open grassy plains. Note, a shrill whistle. It appears a very silly bird: a man on horseback, by riding round and round in a circle, or rather in a spire, so as to approach closer each time, may knock on the head almost as many as he pleases. The more common method is to catch them with a running noose, or little lazo, made of the stem of an ostrich's feather, fastened to the end of a long stick.\* A boy on a quiet old horse will frequently thus catch thirty or forty in a day. The flesh of this bird, when cooked, is most delicately white, but rather tasteless.

The egg of this species, I believe, closely resembles that of the two following.

2. *NOTHURA MINOR. Wagl.*

*Nothura minor, Wagl. Syst. Av. p. sp. 4.*

*Tinamus minor, Spix, Av. Br. pl. 82.*

I procured a specimen of this bird at Bahia Blanca, in northern Patagonia, where it frequented the sand-dunes and the surrounding sterile plains. Its habits appear similar to those of the *N. major*, but it lies closer and does not so readily take to the wing. It is the smallest of the species mentioned in this work, and its plumage is less distinctly spotted. The egg of this bird is described below. Spix's specimens were obtained at Tijuco in Brazil. The figure in his work on the Birds of Brazil, differs slightly from mine, in being less marked on the breast.

3. *NOTHURA PERDICARIA G. R. Gray.*

*Crypturus perdicarius, Kütitz, Vögel von Chili.*

This species closely resembles, in its general appearance and habits, the

\* In Hearne's Travels in North America, (p. 383), it is stated that the Northern Indians shoot the varying hare, which will not bear to be approached in a straight line, in an analogous manner, by walking round it in a spire. The middle of the day is the best time, when the shadow of the hunter is not very long.



*N. major*, of which probably it is the analogue on the western side of the Cordillera. It is larger and has a considerably longer beak than the *N. major*; its breast is not spotted, and its abdomen has a less fulvous tinge. The *N. perdicarius* runs on the open ground, generally a pair together, in the same unconcealed manner, as its analogue, and does not readily lie close. Flight similar, but on rising it utters a shriller whistle, of a different tone. It does not appear to be so easily caught as the Plata species. It is tolerably abundant in all parts of Chile, as far north as the valley of Guasco; but I was assured, that it has never been seen in the valley of Copiapo, although only seventy miles north of Guasco, and of a similar character. The egg is very glossy and of a peculiar colour, which, according to Werner's nomenclature, is a palish chocolate red: length in longer axis 2·07 of an inch; shorter axis 1·495 of an inch. The egg of the *N. minor* is of a similar colour, but a shade paler, and rather smaller; its length being 1·815, and its transverse diameter 1·3 of an inch.

#### RHYNCHOTUS RUFESCENS. Wagl.

Rhynchotus rufescens, Wagl. Av. Syst.

Tinamus rufescens. Temm. Gall. iii. p. 552.

Rhynchotus fasciatus. Spix. Av. Br. pl. 76.

Cryptura Guaza. Vieill.

Crypturus rufescens. Licht. Vög. Verz. s. 67.

My specimens were procured at Maldonado, where it is a much rarer bird than the *Nothura major*; I met with it also in the sterile country near Bahia Blanca. At Maldonado it frequented swampy thickets on the borders of lakes. It lies very close, and is unwilling to rise, but often utters, whilst on the ground, a very shrill whistle. When on the wing, it flies to a considerable distance. Several are generally found together, but they do not rise at the same instant, like a covey of partridges. Flesh, when cooked, perfectly white. Spix's specimens were procured in the country between St. Paul's and Minas Geraes; so that this bird, as well as the *Nothura minor*, has a considerable range.

#### ORDER—CURSORES. Temm.

##### 1. RHEA AMERICANA. Lath.

This bird is well known to abound on the plains of La Plata. To the north it is found, according to Azara, in Paraguay, where, however, it is not common; to the south its limit appears to be from 42° to 43°. It has not crossed the Cordillera; but

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I have seen it within the first range of mountains on the Uspallata plain, elevated between six and seven thousand feet. The ordinary habits of the ostrich are well known. They feed on vegetable matter, such as roots and grass; but at Bahia Blanca, I have repeatedly seen three or four come down at low water to the extensive mud-banks which are then dry, for the sake, as the Gauchos say, of catching small fish. Although the ostrich in its habits is so shy, wary, and solitary, and although so fleet in its pace, it falls a prey, without much difficulty, to the Indian or Gaucho armed with the bolas. When several horsemen appear in a semicircle, it becomes confounded, and does not know which way to escape. They generally prefer running against the wind; yet at the first start they expand their wings, and like a vessel make all sail. On one fine hot day I saw several ostriches enter a bed of tall rushes, where they squatted concealed, till quite closely approached. It is not generally known that ostriches readily take to the water. Mr. King informs me that in Patagonia, at the Bay of San Blas and at Port Valdes, he saw these birds swimming several times from island to island. They ran into the water, both when driven down to a point, and likewise of their own accord, when not frightened: the distance crossed was about 200 yards. When swimming, very little of their bodies appear above water, and their necks are extended a little forward: their progress is slow. On two occasions, I saw some ostriches swimming across the Santa Cruz river, where it was about four hundred yards wide, and the stream rapid. Captain Sturt,\* when descending the Murrumbidgee, in Australia, saw two emus in the act of swimming.

The inhabitants who live in the country readily distinguish, even at a distance, the male bird from the female. The former is larger and darker coloured,† and has a larger head. The ostrich, I believe the cock, emits a singular, deep-toned, hissing note. When first I heard it, standing in the midst of some sand-hillocks, I thought it was made by some wild beast, for it is a sound that one cannot tell whence it comes, or from how far distant. When we were at Bahia Blanca in the months of September and October, the eggs were found, in extraordinary numbers, all over the country. They either lie scattered single, in which case they are never hatched, and are called by the Spaniards, huachos, or they are collected together into a shallow excavation, which forms the nest. Out of the four nests which I saw, three contained twenty-two eggs each, and the fourth twenty-seven. In one day's hunting on horseback sixty-four eggs were found; forty-four of these were in two nests, and the remaining twenty scattered huachos. The Gauchos unanimously affirm, and there is no reason to doubt their statement, that the male

\* Sturt's Travels, vol. ii. p. 74.

† A Gaucho assured me that he had once seen a snow-white, or Albino variety, and that it was a most beautiful bird.



bird alone hatches the eggs, and for some time afterwards accompanies the young. The cock when on the nest lies very close; I have myself almost ridden over one. It is asserted that at such times they are occasionally fierce, and even dangerous, and that they have been known to attack a man on horseback, trying to kick and leap on him. My informer pointed out to me an old man, whom he had seen much terrified by one chasing him. I observe, in Burchell's Travels in South Africa, that he remarks, "having killed a male ostrich, and the feathers being dirty, it was said by the Hottentots to be a nest bird." I understand that the male emu, in the Zoological Gardens, takes care of the nest: this habit therefore is common to the family.\*

The Gauchos unanimously affirm that several females lay in one nest. I have been positively told, that four or five hen birds have been actually watched and seen to go, in the middle of the day, one after the other, to the same nest. I may add, also, that it is believed in Africa, that two or more females lay in one nest.† Although this habit at first appears very strange, I think the cause may be explained in a simple manner. The number of eggs in the nest varies from twenty to forty, and even to fifty; and according to Azara to seventy or eighty. Now although it is most probable, from the number of eggs found in one district being so extraordinarily great, in proportion to that of the parent birds, and likewise from the state of the ovarium of the hen, that she may in the course of the season lay a large number, yet the time required must be very long. Azara states,‡ that a female in a state of domestication laid seventeen eggs, each at the interval of three days one from another. If the hen were obliged to hatch her own eggs, before the last was laid, the first probably would be addled; but if each laid a few eggs at successive periods, in different nests, and several hens, as is stated to be the case, combined together, then the eggs in one collection would be nearly of the same age. If the number of eggs in one of these nests is, as I believe, not greater on an average than the number laid by one female in the season, then there must be as many nests as females, and each cock bird will have its fair share of the labour of incubation; and this during a period when the females probably could not sit, on account of not having finished laying.§ I have before mentioned the great numbers of huachos, or scattered

\* It appears, also, from Mr. Gould's late most interesting discoveries regarding the habits of the *Talegalla Lathamii*, (an Australian bird, one of the Rasores,) that several females lay in one nest, and that the eggs are hatched by the heat engendered by a mass of decaying vegetable matter. It appears that the males assist the females in scratching together the leaves and earth, of which the great conical mound or nest is composed.

† Burchell's Travels, vol. i. p. 280.

‡ Azara, vol. iv. p. 173.

§ Lichtenstein, however, (Travels, vol. ii. p. 25.) states, that the hens begin to sit when ten or twelve eggs are laid, and that they afterwards continue laying. He affirms that by day the hens take turns in sitting, but that the cock sits all night.

eggs; so that in one day's hunting the third part found were in this state. It appears odd that so many should be wasted. Does it not arise from some difficulty in several females associating together, and in finding a male ready to undertake the office of incubation? It is evident that there must at first be some degree of association, between at least two females; otherwise the eggs would remain scattered at distances far too great to allow of the male collecting them into one nest. Some authors believe that the scattered eggs are deposited for the young birds to feed on. This can hardly be the case in America, because the huachos, although often found addled and putrid, are generally whole.

## 2. RHEA DARWINII. Gould.

PLATE XLVII.

Gould, in Proceedings of Zoological Soc. 1837, p. 35.

*R. pallide fusca, plumâ singulâ distinctâ semilunari notâ candidâ terminatâ; capite collo, femoribusque pallidioribus: rostri culmine augusti, ad apicem latiore, frontes plumis parvis setosis anticè directis et supra nares extensis; tarsi lateribus in dimidiam partem plumis parvis mollibus tectis; tarso  $\frac{2}{3}$  antice posticeque toto, squamis reticulatis tecto.*

Long. tot. 52 unc. ; alæ, 30; tarsi, 11; rostri, 2.

The whole of the plumage light brown, each feather with a decided crescent-shaped mark of pure white at the extremity; head, neck, and thighs lighter; base of the neck blackish; culmen of the bill narrow, becoming a little broader towards apex; front with small bristly feathers, pointing forwards and reaching over the nostrils. Tarsus with small downy feathers on sides, extending half way downwards; upper two-thirds of front of tarsus, and whole hinder side, with reticulated scales.

Habitat, Eastern Patagonia (Lat. 40° S. to 54° S.)

This species, which Mr. Gould, in briefly characterizing it at a meeting of the Zoological Society, has done me the honour of calling after my name, differs in many respects from the *Rhea Americana*. It is smaller, and the general tinge of the plumage is a light brown in place of grey; each feather being conspicuously tipped with white. The bill is considerably smaller, and especially less broad at its base; the culmen is less than half as wide, and becomes slightly broader towards the apex, whereas in the *R. Americana* it becomes slightly narrower; the extremity, however, of both the upper and the lower mandible, is more tumid in the latter, than in the *R. Darwinii*.



	R. Darwinii.	R. Americana.
	inches	inches
Length of beak, from edge of membrane at base to the apex	2	2 $\frac{6}{8}$
Length, from anterior margin of eye to apex	3 $\frac{4}{8}$	5 $\frac{6}{8}$
Width of upper mandible, measured across middle of nostrils	1 $\frac{1}{2}$	1 $\frac{6}{8}$

The skin round and in front of the eyes is less bare in *R. Darwinii*; and small bristly feathers, directed forwards, reach over the nostrils. The feet and tarsi are nearly of the same size in the two species. In the *R. Darwinii*, short plumose feathers extend downwards in a point on the sides of the tarsus, for about half its length. The upper two-thirds of the tarsus, in front, is covered with reticulated scales in place of the broad transverse band-like scales of the *R. Americana*; and the scales of the lower third are not so large as in the latter. In the *R. Darwinii* the entire length of the back of the tarsus is covered with reticulated scales, which increase in size from the heel upwards: in the common *Rhea*, the scales on the hinder side of the tarsus are reticulated only on the heel, and about an inch above it; all the upper part consisting of transverse bands, similar to those in front.

The first notice I received of this species was at the Rio Negro, in Northern Patagonia, where I repeatedly heard the Gauchos talking of a very rare bird, called *Avestruz Petise*. They described it as being less than the common ostrich (which is there abundant), but with a very close general resemblance. They said its colour was dark and mottled, and that its legs were shorter, and feathered lower down than those of the common ostrich. It is more easily caught by the bolas than the other species. The few inhabitants who had seen both kinds, affirmed that they could distinguish them apart, from a long distance. The eggs, however, of the small species appeared more generally known, and it was remarked with surprise, that they were very little less than those of the common *Rhea*, but of a slightly different form, and with a tinge of pale blue. Some eggs which I picked up on the plains of Patagonia, agree pretty well with this description; and I do not doubt are those of the Petise. This species occurs most rarely in the neighbourhood of the Rio Negro; but about a degree and a half further south they are tolerably abundant. One Gaucho, however, told me he distinctly recollected having seen one, many years before, near the mouth of the Rio Colorado, which is north of the Rio Negro. They are said to prefer the plains near the sea. When at Port Desire in Patagonia (Lat. 48°), Mr. Martens shot an ostrich; I looked at it, and from most unfortunately forgetting at the moment, the whole subject of the Petises, thought it was a two-third grown one of the common sort. The bird was skinned and cooked before my memory returned. But the head, neck, legs, wings, many of the larger feathers, and a large part of the skin, had been preserved. From these a very nearly perfect specimen has

been put together, and is now exhibited in the museum of the Zoological Society. M. A. D'Orbigny, a distinguished French naturalist, when at the Rio Negro, made great exertions to procure this bird, but had not the good fortune to succeed. He mentions it in his Travels (vol. ii. p. 76.) and proposes (in case, I presume, of his obtaining a specimen at some future time, and thus being able to characterize it,) to call it *Rhea pennata*. A notice of this species was given long since (A.D. 1749) by Dobrizhoffer, in his account of the Abipones (vol. i. Eng. Trans. p. 314). He says, "You must know, moreover, that Emus differ in size and habits in different tracts of land; for those that inhabit the plains of Buenos Ayres and Tucuman are larger, and have black, white, and grey feathers; those near to the Strait of Magellan are smaller, and more beautiful, for their white feathers are tipped with black at the extremity, and their black ones in like manner terminate in white."

Among the Patagonian Indians in the Strait of Magellan, we found a half-bred Indian, who had lived some years with this tribe, but had been born in the northern provinces. I asked him if he had ever heard of the Avestruz Petise? He answered by saying, "Why there are none others in these southern countries." He informed me that the number of eggs in the nest of the Petise is considerably less than with the other kind, namely, not more than fifteen on an average; but he asserted that more than one female deposited them. At Santa Cruz we saw several of these birds. They were excessively wary: I think they could see a person approaching, when he was so far off as not to distinguish the ostrich. In ascending the river few were seen; but in our quiet and rapid descent, many, in pairs and by fours or fives, were observed. It was remarked by some of the officers, and I think with truth, that this bird did not expand its wings, when first starting at full speed, after the manner of the northern kind. The fact of these ostriches swimming across the river has been mentioned. In conclusion, I may repeat that the *R. Americana* inhabits the eastern plains of S. America as far as a little south of the Rio Negro, in lat. 41°, and that the *R. Darwinii* takes its place in Southern Patagonia; the part about the Rio Negro being neutral territory. Wallis saw ostriches at Bachelor's river (lat 53° 54'), in the Strait of Magellan, which must be the extreme southern possible range of the Petise.

#### ORDER—GRALLATOIRES.

##### OREOPHILUS TOTANIROSTRIS. *Jard. & Selb.*

*Oreophilus totanirostris*, *Jard. & Selb.* Illustr. of Orn. iii. pl. 151.

My specimens were obtained at Maldonado and at Valparaiso. At the former, it was common, feeding on the open grassy plains in small flocks, mingled with the icteri and the thrush-like *Xolmis variegata*. When these birds



rise on the wing, they utter a plaintive cry. Legs "crimson red;" toes leaden colour, with their under surface remarkably soft and fleshy. Iris dark brown.

CHARADRIUS VIRGININUS. *Borkh.*

Charadrius virgininus, *Borkh.* Act. Acad. Cæs. Leop. Car. Nat. Cur. 1834. xvi. pl. 18.  
Charadrius marmoratus, *Wagl.*

This representative of the golden plover of Europe and North America, is common on the banks of the Plata in large and small flocks. It is found also, according to Meyer, in Chile.

1. SQUATAROLA CINCTA. *Jard. & Selby.*

Tringa Urvillii, *Garnot*, Ann. Ic. Nat. Jan. 1826.  
Vanellus cinctus, *Less.* Voy. de la Coqu. Zool. p. 720. pl. xliii.  
Squatarola cincta, *Jard. & Selby's* Illust. Orn. pl. 110.  
Charadrius rubecola, *Vig.* Journ. iv. p. 96.

I obtained specimens of this bird in Tierra del Fuego, where it inhabited both the sea shore and the bare stony summits of the mountains; at the Falkland Islands, where it frequented the upland marshes; and at Chiloe, where I met with large flocks in the fields, not near the coast.

2. SQUATAROLA FUSCA. *Gould.*

*S. vertice corporeque supra fuscis, dorsi parapterique plumis pallidiore marginatis; remigibus primariis nigrescenti fuscis, pogoniis externis albo angustè marginatis rhachibus albis; uropygio caudæque obscurè fuscis, remigibus externis albo latè marginatis et terminatis; fronte, genis, gula, abdomine postico, caudæque tegminibus inferioribus flavescenti albis, colli pectorisque lateribus fuscis, colli plumis fusco pallido terminatis; pedibus nigris.*

Long. tot. 8 unc.  $5\frac{3}{8}$ ; caudæ, 3; tarsi,  $1\frac{3}{8}$ ; rostri,  $\frac{7}{8}$ .

Crown of the head, all the upper surface brown, the feathers of the back and the scapularies, margined with paler; primaries blackish brown, finely edged on their inner margins with white, and with white shafts; rump and tail dark brown, the outer feathers largely margined and tipped with white; forehead and sides of the face sandy white; throat, lower part of the abdomen, and under tail coverts, buffy white; sides of the neck and chest brown; the feathers of the latter tipped with still lighter brown; bill and feet black.

Habitat, Maldonado; inland glassy plains.

This species is most closely allied to the foregoing. I obtained only one specimen, which, on comparison with several of the *S. cincta*, appears a little larger in all its dimensions, especially in the length of the tarsi. Its back and scapu-

laries are of a more uniform brown, the feathers being less edged with pale brown. Its feet are black, whereas those of *S. cincta* are brown.

PHILOMACHUS CAYANUS. *G. R. Gray.*

Charadrius Cayanus, *Lath.* Ind. Orn. 11. 748.

I met with this bird from latitude 30° to 45° S. on both sides of S. America. In La Plata it is called "Teru-tero," in imitation of its cry; and in Chile, according to Molina, "Theghel." These birds, which in many respects resemble in habits our peewits (*Vanellus cristatus*), frequent, generally in pairs, open grassy land, and especially the neighbourhood of lakes. As the peewit takes its name from the sound of its voice, so does the teru-tero. While riding over the grassy plains, one is constantly pursued by these birds, which appear to hate mankind, and I am sure deserve to be hated, for their never-ceasing, unvaried, harsh screams. The stillness of the night is often disturbed by them. To the sportsman they are most annoying, by announcing to every other bird and animal his approach: to the traveller in the country, they may possibly, as Molina says, do good, by warning him of the midnight robber. During the breeding season, they attempt, like our peewits, by feigning to be wounded, to draw away from their nests dogs and other enemies. Their eggs are of a pointed oval form; of a brownish olive colour, thickly spotted with dark brown. Their eggs, like those of the peewit, are esteemed particularly good eating.

1. HIATICULA AZARÆ. *G. R. Gray.*

Charadrius Azaræ, *Temm.* pl. col. 184.  
—— collaris, *Vieill.*  
Albatutui à collier noir, *Azara*, No. 392.

My specimens were obtained on the banks of the Plata and at Valparaiso. The specimen from the latter country differs from those procured at the former, in the absence of the black collar on the breast, of the black streak running from the eye to the corner of the mouth; in the plumage of the back and back of head having a lesser tinge of red; and especially in the feet being black, and tarsi blackish, instead of both being orange, as is the case with those killed on the shores of the Plata. I have not, however, thought it desirable to make two species of these birds, not having a larger series of specimens for comparison.

2. HIATICULA TRIFASCIATUS. *G. R. Gray.*

Charadrius bifasciatus, *Licht.* Vog. Verz. p. 71.  
—— trifasciatus, *Wagl.* Syst. Av. sp. 31.

I procured two specimens of this bird at Bahia Blanca, in Northern Patagonia.



3. HIATICULA SEMIPALMATA. *G. R. Gray.**Tringa semipalmata, Temm.**Charadrius semipalmatus, Coup. Isis. 1825, p. 1375, t. 14. Wagl. Syst. Av. sp. 23.**Bonap. Am. Orn. iv. pl. 25, f. 4.*

Galapagos Archipelago.

HEMATOPUS PALLIATUS. *Temm.*

Rio Plata.

EGRETTA LEUCE. *Bonap.**Ardea Leuce, Ill.**Ardea Egretta, Wils. Am. Orn. pl. 61, f. 4.*

My specimen was procured at Maldonado. I saw it also in Patagonia.

ARDEA HERODIAS. *Linn.*

Galapagos Archipelago. Frequents the sea-coast and salt-lagoons. There are no fresh water pools in any of these islands.

1. NYCTICORAX VIOLACEUS. *Bonap.**Ardea violacea, Linn.**Ardea callocephala, Wagl. Syst. Av.*

Mr. G. R. Gray has thought it advisable to give the following description of this specimen, from the Gallapagos Archipelago. It appears to be a young bird, and is small in all its dimensions.

Upper part blackish-grey; each feather marked down the middle with a broad stripe of black, and tinged on the margins with shining bronze-brown; beneath the body blueish-grey, with the front of the neck, top of the head, and margins of the feathers on the thighs rufous; the sides of the head and throat deep black, the former divided in the middle on each side with a patch of white; the bill black, and feet of a pale reddish colour.

2. NYCTICORAX AMERICANUS. *Bonap.**Ardea nycticorax, Wils. (young bird.)*

Valparaiso, Chile.

THERISTICUS MELANOPS. *Wagl.**Ibis melanops, Lath. Hist. ix. pl. 150.*

This bird frequents the desert gravelly plains of Patagonia, as far south as lat. 48°: in the British Museum there are specimens which Captain Clapperton brought from central Africa; so that this bird has an extraordinarily wide range. It generally lives in pairs, but during part of the year in small flocks. Its cry is very singular and loud: when it is heard at a distance it closely resembles the neighing of the guanaco. I opened the stomach of two specimens, and found in them remains of lizards, cicadae, and scorpions. It builds in rocky cliffs on the

sea-shore: egg dirty white, freckled with pale reddish-brown; its circumference over longer axis is seven inches. The legs are carmine and scarlet-red: iris scarlet-red.

IBIS (FALCINELLUS) ORDI. *Bonap.**Tantalus Mexicanus, Ord. Journ. Acad. Phil.**Tantalus chalcopterus? Temm.**Ibis Falcinellus, Bonap. Am. Orn. iii.*

My specimen was obtained at the Rio Negro: it is very numerous in large flocks on the vast swampy plains between Bahia Blanca and Buenos Ayres. Its flight when soaring is singularly graceful; the whole flock moving in precise concert.

1. NUMENIUS HUDSONICUS. *Lath.**Numenius Hudsonicus, Lath. Ind. Orn. ii. 712.*

This curlew is very abundant on the tidal mud-banks of Chiloe. When the flock rises, each bird utters a shrill note.

2. NUMENIUS BREVIROSTRIS. *Licht.**Numenius brevirostris, Licht. Cat. 75, sp. 774 a.*

Buenos Ayres.

LIMOSA HUDSONICA. *Swains.**Scolopax Hudsonica, Lath. Ind. Orn. ii. 720.*

My specimens were obtained from the Falkland Islands and from Chiloe, where it frequented the tidal mud-banks in flocks.

1. TOTANUS FLAVIPES. *Vieill.**Totanus flavipes, Vieill. Ency. Meth. 1106.**Yellow shanks snipe, Penn. Arct. Zool. ii. 468.**Wills. Am. Orn. pl. 58. f. 4.*

Monte Video, Rio Plata.

2. TOTANUS MACROPTERUS. *G. R. Gray.**Tringa macroptera, Spix. Av. n. sp. pl. 92.*

Monte Video, Rio Plata.



3. TOTANUS MELANOLEUCOS. *Licht. et Vieill.*

*Scolopax melanoleuca*, *Gmel.*  
*Scolopax vociferus*, *Wils.* Am. Orn. pl. 58, f. 5.  
 Chorlito à croupion blanc, *Azara*, No. 394.  
*Totanus solitarius*, *Vieill.*  
 White-rumped snipe, *Lath.*

Maldonado, Rio Plata.

4. TOTANUS FULIGINOSUS. *Gould.*

*T. corpore supra caudâque fuliginoso-griseis; alis fuscis; gutture albo; pectore hypochondriâque plumbeo-griseis; abdomine medio, caudæ tegminibus inferioribus albis, illis obscure, his plane griseiscenti fusco fasciatis; rostri rubescenti fusco; pedibus obscure olivaceo fuscis.*

Long. tot.  $9\frac{1}{2}$  unc. *alæ*,  $6\frac{5}{8}$ ; *caudæ*, 3; *tarsi*,  $1\frac{1}{4}$ ; *rostri*,  $\frac{5}{8}$ .

The whole of the upper surface and tail sooty-grey; wings dull brown; throat white; chest and flanks leaden grey; centre of the abdomen and under tail coverts white, the former indistinctly, and the latter distinctly, barred with greyish brown; bill, reddish-brown; feet, dark olive-brown.

Habitat, Galapagos Archipelago (*October*).

This species appear quite distinct from any described one.

HIMANTOPUS NIGRICOLLIS. *Vieill.*

*Himantopus nigricollis*, *Vieill.* Ency. Meth. 340.  
*Recurvirostra himantopus*, *Wils.* Am. Orn. pl. 58, f. 2.

My specimens were obtained from the provinces bordering the Plata. On the great swampy plains and fens which lie between Buenos Ayres and Bahia Blanca, it is very numerous in small, and occasionally, in large flocks. This plover, which appears as if mounted on stilts, has been wrongfully accused of inelegance; when wading about in shallow water, which is its favourite resort, its gait is far from awkward. In a flock it utters a noise, which singularly resembles the cry of a pack of small dogs in full chase: when I travelled across the above mentioned plains, I was more than once startled, when lying awake at night, at the distant sound, and thought the wild Indians were coming.

TRINGA RUFESCENS. *Vieill.*

*Tringa rufescens*, *Vieill.*, N. Diet. d'Hist. Nat. 34, p. 470.  
 ———— Ency. Meth. Orn. p. 1090.  
 ———— Gal. des Ois. pl. 238.  
 ———— *Yarrel*, Lin. Trans.  
 ———— *Gould*; Birds of Europe, pl.

Monte Video, Rio Plata.

1. PELIDNA SCHINZII. *Bonap.*

*Tringa Schinzii*, *Brehm.* *Bonap.* Am. Orn. iv, pl. 24, f. 2.  
*Pelidna cinclus*, var. *Say.*

Flocks of this species were common on the shores of the inland bays in the southern parts of Tierra del Fuego.

2. PELIDNA MINUTILLA. *Gould.*

*Tringa minutilla*, *Vieill.* Ency. Meth. 1089.

Galapagos Archipelago. Both the specimens which I procured here are smaller than the ordinary size of this bird, but do not differ in other respects. Vieillot says it ranges from the Antilles to Canada.

RHYNCHÆA SEMICOLLARIS. *G. R. Gray.*

*Totanus semicollaris*, *Vieill.*, Ency. Meth. p. 1100.  
*Rhynchæa Hilairea*, *Valenc. Less.* Ill. de Zool. pl. 18.  
*Rhynchæa occidentalis*, *King*, Zool. Journ. iv. 94.  
 Le chorlito a demi colliers blanc et noirâtre, *Azara*, No. 409.

Monte Video, Rio Plata. Frequents swamps; habits like the *Scolopax Gallinago*.

1. SCOLOPAX (TELMTIAS) PARAGUAIE. *Vieill.*

*Scolopax Paraguai*, *Vieill.* Ency. Meth. p. 1160.  
 ———— *Brasilensis*, *Swains.* Faun. Bor. Am. Birds, p. 400.  
*Becassine 1st Espece*, *Azara*.

Valparaiso and Maldonado, Rio Plata.

2. SCOLOPAX (TELMTIAS) MAGELLANICUS. *King.*

*Scolopax Magellanicus*, *King*, Zool. Journ.

My specimens were obtained from Maldonado and East Falkland Island. Flight a very little less irregular and rapid than the English snipe. I several times in May observed this, as well as the foregoing species, flying in lofty circles, and suddenly stooping downwards, at the same time that it uttered a peculiar drumming noise, similar to that made by the English snipe in summer, when breeding. This species is most closely allied to the foregoing, but I have no doubt it is distinct; because at the time when I procured specimens of both at Maldonado, I perceived a difference between them. This species is there more abundant than the *S. Paraguaiæ*. Its beak is nearly three-tenths of an inch shorter, and the culmen rather broader. The plumage of its back is of a decidedly less dark tint; each separate feather having much less black in it.



STREPSILAS INTERPRES. *Ill.*Tringa Morinellus, *L.*

I obtained specimens from Iquique, on the coast of Peru, and from the Galapagos Archipelago.

CREX LATERALIS. *Licht.*Crex lateralis, *Licht.*, Cat. p.

Griff. An. King. Aves.

Maldonado, Rio Plata. On being disturbed readily takes wing. Base of the bill, especially of the lower mandible, bright green.

1. ZAPORNIA NOTATA. *Gould.*

PLATE XLVIII.

*Z. corpore toto supra nigrescenti-fusco, plumâ singulâ medio albo-guttatâ et olivaceo-fusco latè marginatâ; remigibus fuscis, mento albo, corpore infra fusciscenti-nigro, gutture pectoreque albo-striatis; abdomine tegminibusque caudæ inferioribus albo irregulariter transversè strigato; rostro obscure corneo; pedibus olivaceo-viridibus.*

Long. tot.  $5\frac{1}{2}$  unc.; alæ,  $3\frac{1}{4}$ ; caudæ,  $1\frac{3}{8}$ ; tarsi,  $\frac{7}{8}$ ; rostri,  $\frac{1}{2}$ .

The whole of the upper surface blackish brown, each feather spotted with white down the centre, and largely margined with olive brown; quills plain brown; chin white; the remainder of the under surface brownish black, striated with white on the throat and chest, and crossed by irregular bars of the same on the abdomen and under tail coverts; bill dark horn colour; feet olive green.

Habitat, Rio Plata. (Shot on board the Beagle.)

2. ZAPORNIA SPILONOTA. *Gould.*

PLATE XLIX.

*Z. capite corporeque infra, nigrescenti-griseis; corpore supra obscure rubrofusco, uropygio obscure grisescenti-nigro; alis hypochondriis postice, tegminibusque caudæ inferioribus albo parciter sparsis; rostro nigrofusco; pedibus rubescentibus; iridibus carmineis.*

Long. tot.  $5\frac{1}{2}$  unc.; alæ,  $2\frac{3}{4}$ ; caudæ, 1; tarsi,  $\frac{7}{8}$ ; rostri,  $\frac{3}{4}$ .

Head and all the under surface blackish grey; all the upper surface dark reddish brown, fading off on the rump into deep greyish black; the wings, hinder part of the flanks, and under tail coverts slightly sprinkled with white; bill, blackish brown; feet, reddish; iris, bright scarlet.

Habitat, Galapagos Archipelago.

This bird frequents in large numbers the high and damp summits of the islands. It lives in the thick beds of carex and other plants, which, from the condensed vapour of the clouds, are constantly kept rather humid. It is tame, but lives concealed; it often utters a loud and peculiar cry. The female is said to lay from eight to twelve eggs. It is, I believe, the only bird in this archipelago which is exclusively confined to the upper parts of the islands. With respect to the specific description, I must observe, that in one of the specimens, the few and small white spots on the wings and abdomen are wanting. This is not a sexual distinction, but possibly may be owing to immaturity.

1. RALLUS PHILLIPENSIS. *Linn.*

Common on the low coral islets, forming the Keeling or Cocos Atoll in the Indian ocean. With the exception of a snipe, this was the only bird without web-feet which inhabited this group.

2. RALLUS YPECAHA. *Vieill.*Rallus ypecaha, *Vieill.* Ency. Meth. p. 1071.Crex melampyga, *Licht.* Cat. Sp.L'Ypacaha, *Azara*, No. 367.

Buenos Ayres.

3. RALLUS SANGUINOLENTUS. *Swains.*Rallus sanguinolentus, *Swains.*, 2 cent. and a quart.

Valparaiso.

GALLINULA CRASSIROSTRIS. *J. E. Gray.*Gallinula crassirostris, *J. E. Gray*, in Griff. An. Kingd.

I obtained specimens on the banks of the Plata and at Valparaiso.

FULICA GALEATA. *G. R. Gray.*Crex galeata, *Licht.* Cat. 80. sp. 826.Yahana proprement dit, *Azara*, No. 379.Gallinula galeata, *Bonap.*

Concepcion, Chile.

PORPHYRIO SIMPLEX. *Gould.*

*P. vertice, remigibus primariis obscure olivaceo-viridibus, harum apicibus flavescens albo anguste marginatis; corpore supra obscure olivaceo-viridi, plumâ singulâ*



*obscurè fulvo late marginatâ; genis gutture, corporeque infra flavescentibus; rostro rubro; pedibus viridescenti-flavis.*

Long. tot. 9 unc.; ala,  $5\frac{1}{2}$ ; cauda,  $2\frac{1}{2}$ ; tarsi,  $1\frac{3}{4}$ ; rostris,  $\frac{7}{8}$ .

Habitat, Ascension Island, Atlantic Ocean. (July.)

This specimen was killed with a stick near the summit of the Island. It was evidently a straggler, which had not long arrived. There is no aboriginal land bird at Ascension.

#### ORDER—PALMIPEDES.

##### ANSER MELANOPTERUS. *Eyton.*

Anser melanopterus, *Eyton*, Monog. Anatidæ, p. 93.

##### PLATE L.

Captain FitzRoy purchased a skin of this fine goose at Valparaiso, which he has presented to the British Museum. There is another specimen at the Zoological Society, which Mr. Pentland procured from the lake of Titicaca, in Bolivia.

##### CHLOEPHAGA MAGELLANICA. *Eyton.*

Anas Magellanica, *Gmel.* Syst. i. 505.

Chloephaga Magellanica, *Eyton*, Monog. Anatidæ, p. 82.

Bernicla leucoptera, *Less.* Trait d'Ornith. 627.

This goose is found in Tierra del Fuego, and at the Falkland Islands; at the latter it is common. They live in pairs and in small flocks throughout the interior of the island, being rarely or never found on the sea-coast, and seldom even near fresh-water lakes. I believe this bird does not migrate from the Falkland Islands; it builds on the small outlying islets. This latter circumstance is supposed to be owing to the fear of the foxes; and it is perhaps from the same cause, that although very tame by day, they are much the contrary in the dusk of the evening. These geese live entirely on vegetable matter; they are called by the seamen, the "upland geese." Mr. Eyton, in his excellent Monograph on the Anatidæ, has described the trachea of this bird, which I brought home in spirits.

##### BERNICLA ANTARCTICA. *Steph.*

Bernicla antarctica, *Steph.* Sh. Zool. xii. 59.

— *Eyton*, Monograph, p. 84.

Anas Antarctica, *Gmel.* Syst. i. 505.

This goose is common in Tierra del Fuego, the Falkland Islands, and on the western coast, as far north as Chiloe. It is called by the sailors the "rock goose," as it lives exclusively on the rocky parts of the sea-coast. In the deep and retired

channels of Tierra del Fuego, the snow-white male, invariably accompanied by his darker consort, and standing close by each other on some distant rocky point, is a common feature in the landscape. Mr. Eyton has described the trachea of this species, which I brought home.

##### PECILONITTA BAHAMENSIS. *Eyton.*

Pecilonitta Bahamensis, *Eyton*, Monog. p. 116.

Anas Bahamensis, *Linn.* Syst. i. 199.

Mareca Bahamensis, *Steph.* Gen. Zool. xii. p. 137.

A specimen was procured from a small salt-water lagoon in the Galapagos Archipelago (*October*.)

It was a male; bill, lead colour; base of superior mandible purple, with a black mark in the upper part.

##### DAFILA UROPHASIANUS. *Eyton.*

Dafila urophasianus, *Eyton*, Monog. Anatidæ, p. 112.

Anas urophasianus, *King*, Zool. Journ. iv. 351.

Bahia Blanca, Northern Patagonia.

##### RHYNCHASPIS MACULATUS. *Gould.*

Rhynchaspis maculatus, *Gould*, in Jard. & Selby Illust. Orn. p. 147. pl. 147.

Mr. Gould observes that, "A good figure of this beautiful shoveller may be found in the 3rd vol. of Messrs. Jardine and Selby's Illustrations of Ornithology. Their figure was taken from an example which I forwarded to those gentlemen with the name of *maculata* attached: my specimen was received from the Rio Plata, and this is also the locality whence (in October) Mr. Darwin's specimen was procured. The numerous and conspicuous spots distributed over the body, renders this species readily distinguishable from all the other members of the genus."

##### 1. QUERQUEDULA ERYTHORHYNCHA. *Eyton.*

Querquedula erythrorhyncha, *Eyton*, Monog. Anatidæ, p. 127.

Anas erythrorhyncha, *Spix*, Av. Nov. sp. pl.

My specimens were obtained from Buenos Ayres (*October*) and the Straits of Magellan (*February*.)

##### 2. QUERQUEDULA CRECCOIDES. *Eyton.*

Querquedula creccoides, *Eyton*, Monog. Anatidæ, p. 128.

Anas creccoides, *King*, Zool. Journ. iv. 99.

Mr. Gould observes that, "This species was first described by Mr. Vigors,



from a specimen in the collection brought from the Straits of Magellan, by Capt. P. P. King. It is a true teal, and in size and form closely assimilates to the common teal of Europe, and to the species inhabiting North America (*Querquedula Carolinensis*, Bonap.) to both of which it is evidently an analogue, and doubtless represents those birds in the southern half of the American continent." My specimens were procured from the Rio Plata, and from the Straits of Magellan.

MICROPTERUS BRACHYPTERUS. *Eyton.*

*Micropterus brachypterus*, *Eyton*, Monog. Anat. p. 144.  
*Anas brachytera*, *Lath.* Ind. Orn. ii. 834.

These great logger-headed ducks, which sometimes weigh as much as twenty-two pounds, were called by the old navigators, from their extraordinary manner of paddling and splashing over the water, race-horses, but now much more properly steamers. Their wings are too small and weak to allow of flight, but by their aid, partly swimming and partly flapping the surface of the water, they move very quickly. The manner is something like that by which the common house duck escapes, when pursued by a dog; but I am nearly sure that the steamer moves its wings alternately, instead of, as in other birds, both together. These clumsy birds make such a noise and splashing, that the effect is most curious. The steamer is able to dive but a very short distance. It feeds entirely on shell-fish from the floating kelp and tidal rocks; hence the beak and head are surprisingly heavy and strong, for the purpose of breaking them. So strong is the head, that I have sometimes scarcely been able to fracture it with my geological hammer; and all our sportsmen soon discovered how tenacious these birds were of life. When pluming themselves in the evening in a flock they make an odd mixture of sounds, somewhat like bull-frogs within the tropics.

1. PODICEPS KALIPAREUS. *Quoy & Gaim.*

My specimens were obtained from Bahia Blanca (September), Northern Patagonia, and the Falkland Islands. In the former place it lived in small flocks in the salt-water channels, extending between the great marshes at the head of the harbour. At the Falkland Islands I saw (March) very few individuals; and these only in one small fresh-water lake. Tarsi of the same colour as the plumage of the back; iris of a beautiful tint, between "scarlet and carmine red;" pupil black. Mr. Gould remarks that, "This beautiful species of *Podiceps* is equal in size, and has many of the characters of the *P. auritus*, but is at once distinguished from that species by the silvery colouring of the plumes that adorn the sides of the head; which in *P. auritus* are deep chestnut."

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2. PODICEPS ROLLANDII. *Quoy et Gaim.*

*Podiceps Rolland*, *Quoy et Gaim.* Voy. de l'Uranie, pl. 36, p. 133.

I obtained specimens from the Falkland Islands (March), where it was common at the head of the tortuous bays which intersect those islands; from a fresh water lake near the Strait of Magellan (February); and from the eastern coast of Chiloe. The male and female have the same plumage. Iris of a fine red colour. Mr. Gould adds that, "this species appears to be as nearly related to the *Podiceps cornutus*, as the preceding species is to *P. auritus*, but is readily distinguishable from it, by the white spot in the centre of the tuft of feathers that spring from the sides of the face."

3. PODICEPS CHILENSIS. *Garnot.*

Le macas cornu, *Azara*, No. 443.

This specimen was procured in a fresh-water lake near Buenos Ayres. Capt. P. King brought home specimens from the salt-water channels in Tierra del Fuego, where it is excessively numerous. It often makes a very melancholy cry, which suits the gloomy climate of those desolate shores.

SPHENISCUS HUMBOLDTII. *Meyen.*

*Spheniscus Humboldtii*, *Meyen*. Nov. Act. Acad. Cæs. Leop. Car. Nat. Cur. 1834, 110, pl. 21.

My specimen was obtained near Valparaiso. Meyen, who first described this bird, procured it from the coast of Peru.

PUFFINUS CINEREUS. *Steph.*

*Puffinus cinereus*, *Steph.* Gen. Zool. xiii. p. 227.  
*Procellaria puffinus*, *Linn.*

This bird frequents the seas on the whole coast of South America. I obtained specimens from Tierra del Fuego, Chiloe, the mouth of the Plata, and Callao Bay on the coast of Peru. It is likewise known to be common in the Northern Hemisphere; this species, therefore, has a most extensive range. It generally frequents the retired inland sounds in very large flocks; although, occasionally, two or three may be seen out at sea. I do not think I ever saw so many birds of any other sort together, as I once saw of these petrels, behind the Island of Chiloe. Hundreds of thousands flew in an irregular line, for several hours in one direction. When part of the flock settled on the water, the surface was blackened; and a cackling noise proceeded from them, as of human beings talking in the distance. At this time, the water was in parts coloured by clouds of small crustacea. The inhabitants of Chiloe told me that this petrel was very irregular

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in its movements;—sometimes they appeared in vast numbers, and on the next day not one was to be seen. At Port Famine, every morning and evening, a long band of these birds continued to fly with extreme rapidity, up and down the central parts of the channel, close to the surface of the water. Their flight was direct and vigorous, and they seldom glided with extended wings in graceful curves, like most other members of this family. Occasionally, they settled for a short time on the water; and they thus remained at rest during nearly the whole of the middle of the day. When flying backwards and forwards, at a distance from the shore, they evidently were fishing: but it was rare to see them seize any prey. They are very wary, and seldom approach within gun-shot of a boat or of a ship;—a disposition strikingly different from that of most of the other species. The stomach of one, killed near Port Famine, was distended with seven prawn-like crabs, and a small fish. In another, killed off the Plata, there was the beak of a small cuttle-fish. I observed that these birds, when only slightly winged, were quite incapable of diving. There is no difference in the plumage of the sexes. The web between the inner toes, with the exception of the margin, is “reddish-lilac-purple;” the rest being blackish. Legs and half of the lower mandible blackish purple. From accounts which I have received, the individuals of this species, which live in the Northern Hemisphere, appear to have exactly the same habits as those above described.

1. PELECANOIDES BERARDI. *G. R. Gray.*

*Puffinuria* Berardi, *Less. Tr. d'Orn.* p. 614.  
*Procellaria* Berardi, *Quoy et Gaim. Voy.* de pl. 31

This bird is common in the deep and quiet creeks and inland seas of Tierra del Fuego, and on the west coast of Patagonia, as far north as the Chonos Archipelago. I never saw but one in the open sea, and that was between Tierra del Fuego and the Falkland Islands. This bird is a complete auk in its habits, although from its structure it must be classed with the Petrels. To the latter Mr. Gould informs me, its affinity is clearly shewn by the form of its beak and nostrils, length of foot, and even by the general colouring of its plumage. To the auks it is related in the general form of its body, its short wings, shape of tail, and absence of hind-toe to the foot. When seen from a distance and undisturbed, it would almost certainly be mistaken, from its manner of swimming and frequent diving, for a grebe. When approached in a boat, it generally dives to a distance, and on coming to the surface, with the same movement takes flight: having flown some way, it drops like a stone on the water, as if struck dead, and instantaneously dives again. No one seeing this bird for the first time, thus diving

like a grebe and flying in a straight line by the rapid movement of its short wings like an auk, would be willing to believe that it was a member of the family of petrels;—the greater number of which are eminently pelagic in their habits, do not dive, and whose flight is usually most graceful and continuous. I observed at Port Famine, that these birds, in the evening, sometimes flew in straight lines from one part of the sound to another; but during the day, they scarcely ever, I believe, take wing, if undisturbed. They are not very wild: if they had been so, from their habit of diving and flying, it would have been extremely difficult to have procured a specimen. The legs of this bird are of a “flax-flower blue.”

2. PELECANOIDES GARNOTII. *G. R. Gray.*

*Puffinuria* Garnotii, *Less. Voy. de l'Coqu.* pl. 46.  
*Procellaria* urinatrix, *Gm.* ?

My specimen was obtained at Iquique (lat. 20° 12'), on the coast of Peru. M. Lesson, who first described this species, says (*Manuel d'Ornithologie*, vol. ii. p. 394.), “*Le puffinure de Garnot* habite par grandes troupes le long des côtes du Pérou. Il vole médiocrement bien, d'une manière précipitée et en rasant la mer; mais il préfère se tenir en repos sur la surface des eaux, et plonge très fréquemment à la manière des grèbes, sans doute pour saisir les petits poissons qui forment sa pâture.” An anatomical description of this bird is there given.

1. PROCELLARIA GIGANTEA. *Gmel.*

This bird, which is called by the English, “Nelly,” and by the Spaniards, “Quebranta-huesos,” (properly an osprey,) is common in the southern latitudes of South America. It frequents both the inland sounds, and the open ocean far from the coast. It often settles and rests on the water. The Nelly, in its flight and general appearance on the wing, has many points of resemblance with the Albatross; but, as in the case of that bird, it is in vain to attempt observing on what it feeds; both seem to hunt the waters for days together, in sweeping circles, with no success. In the stomach, however, of one which I opened, there was the beak of a large cuttle-fish. The Nelly, moreover, is a bird of prey: it was observed at Port St. Antonio, by some of the officers of the Beagle, to kill a diver. The latter tried to escape, both by diving and flying, but was continually struck down, and at last was killed by a blow on its head. At Port St. Julian, also, these great petrels were seen killing and devouring young gulls. The Nelly breeds on several of the small islands off the coast of Patagonia; for instance, Sea-Lion Island, in the mouth of the Santa Cruz. Most other species of the family retire for the purpose of breeding to the Antarctic Islands.



I have often observed in the southern seas, a bird similar in every respect to the Nelly, excepting in its plumage, being of a much more intense black, and its bill rather whiter. I procured a specimen thus coloured, at Port Famine, and had concluded that it was a distinct species, until Mr. Low, (an excellent practical observer, long acquainted during his sealing voyages with the productions of these seas,) assured me that he positively knew, that these black varieties were the one-year-old birds of the common greyish black Nelly.

2. PROCELLARIA GLACIALOIDES. *A. Smith.*

*Procellaria glacialis*, *A. Smith*, *Illustr. of Zool. of S. Africa*, Aves, pl. 51.

I saw this petrel on both sides of the Continent south of lat. 30°; but seldom more than two or three together. I am informed that it arrives in Georgia in September for the purpose of breeding, and that it lays its eggs in holes in the precipices overhanging the sea. On the approach of winter it is said to retire from that island. My specimen was caught in the Bay of St. Mathias (lat. 43° S.) by a line and bent pin, baited with a small piece of pork; the same means by which the Pintado (*Dapt. Capensis*) is so easily caught. It is a tame, sociable, and silent bird; and often settles on the water: when thus resting it might from a distance be mistaken, owing to the general colour of its plumage, for a gull. One or two often approached close to the stern of the Beagle, and mingled with the Pintados, the constant attendants on vessels traversing these southern seas.

DAPTION CAPENSIS. *Steph.*

*Procellaria Capensis*, *Linn. Syst. i.* 213.

This petrel is extremely numerous over the whole southern ocean, south of the Tropic of Capricorn. On the coast, however, of Peru, I saw them in lat. from 16° to 17° S., which is considerably farther north than they are found on the shores of Brazil. Cook, in sailing south in the meridian of New Zealand, first met this bird in lat. 43° 30'. The Pintados slightly differ in some of their habits from the rest of their congeners, but, perhaps, approach in this respect nearest to *P. glacialis*. They are very tame and sociable, and follow vessels navigating these seas for many days together: when the ship is becalmed, or is moving slowly, they often alight on the surface of the water, and in doing this they expand their tails like a fan. I think they always take their food, when thus swimming. When offal is thrown overboard, they frequently dive to the depth of a foot or two. They are very apt to quarrel over their food, and they then utter many harsh but not loud cries. Their flight is not rapid, but extremely elegant; and as these prettily mottled birds skim the surface of the water in graceful curves, constantly following the vessel as she drives onward in her course, they afford a spectacle

which is beheld by every one with interest. Although often spending the whole day on the wing, yet on a fine moonlight night, I have repeatedly seen these birds following the wake of the vessel, with their usual graceful evolutions. I am informed that the Pintado arrives in Georgia for the purpose of breeding, and leaves it, at the same time with the *P. glacialis*. The sealers do not know any other island in the Antarctic ocean excepting Georgia, where these two birds (as well as the *Thalassidroma oceanica*) resort to breed.

THALASSIDROMA OCEANICA. *Bonap.*

*Thalassidroma oceanica*, *Bonap. Journ. Acad. Nat. Scien., Philadelphia*, vol. iii. p. 233.

*Procellaria oceanica*, *Forster.*

Pétrel échasse. *Temm.*

I obtained this bird at Maldonado, near the mouth of the Plata, where it was blown on shore by a gale of wind. These birds, although seeming to prefer on most occasions the open ocean, and to be most active, walking with their wings expanded on the crest of the waves, when the gale is heaviest, yet sometimes visit quiet harbours, in considerable numbers. At Bahia Blanca I saw many, when there was nothing in the weather to explain their appearance. I was informed by a sealer, that they build in holes on the sea cliffs of Georgia, where they arrive very regularly in the month of September. No other place is known to be frequented by them for the purpose of breeding.

PRION VITTATUS. *Cuv.*

*Procellaria Vittata*, *Gmelin. Syst. i.* 560.

I did not procure a specimen of this bird, although I saw numbers on both sides of the Continent from about lat. 35° S. to Cape Horn. It is a wild solitary bird, appears always to be on the wing: flight extremely rapid. Mr. Stokes (Assistant surveyor of the Beagle) informs me that they build in great numbers on Landfall Island, on the west coast of Tierra del Fuego. Their burrows are about a yard deep: they are excavated on the hill-sides, at a distance even of half a mile from the sea shore. If a person stamps on the ground over their nests, many fly out of the same hole. Mr. Stokes says the eggs are white, elongated, and of the size of those of a pigeon.

1. LARUS FULIGINOSUS. *Gould.*

*L. Mas. corpore toto obscure plumbeo-griseo, tegminibus caudæ superioribus inferioribusque pallidioribus; rostro basi rubro, apice nigro; pedibus nigris.*

Long. tot. 16½ unc.; alæ, 13½; caudæ, 6; tarsi, 2½; rostri 2¾.



The whole of the plumage deep leaden-grey; the upper and under tail coverts being lightest; bill red at the base, black at the tip; feet black.

Habitat, Galapagos Archipelago (*October*).

This species of gull has many characters in common with the *Larus hæmatorhynchus* of King, from the continent of S. America; but may at once be distinguished from it by the general extreme duskiness of its plumage, feet, tarsi, and bill; and by the more elongated form of the latter. My specimen was killed at James Island. I observed nothing particular in its habits. It is the only species of gull frequenting this Archipelago.

2. *LARUS HÆMATORHYNCHUS*. *King*.

*Larus hæmatorhynchus*, *King*, Zool. Journ. iv. 103.

*Jard. & Selb.* Ill. Orn. p. 106.

This bird was killed at Port St. Julian on the coast of Patagonia. Beak (when fresh killed) of a pale "arterial blood red," legs "vermilion red."

3. *LARUS DOMINICANUS*. *Licht*.

*Larus dominicanus*, *Licht*. Cat. 82. sp. 846.

Grande Mouette, *Azara*, No. 409.

This gull abounds in flocks on the Pampas, sometimes even as much as fifty and sixty miles inland. Near Buenos Ayres, and at Bahia Blanca, it attends the slaughtering-houses, and feeds, together with the Polybori and Cathartes, on the garbage and offal. The noise which it utters is very like that of the common English gull (*Larus canus*, Linn.)

*XEMA* (*CHROICOCEPHALUS*) *CIRROCEPHALUM*. *G. R. Gray*.

*Larus cirrocephalus*, *Vieill.* Nov. Dict. d'Histoire, 21. p. 502.

*Larus maculipennis*, *Licht*. Cat. 83. sp. 855.

*Larus glaucodes*, *Meyen*, Nov. Act. 1839, p. 115. pl. 24.

Mouette cendrée, *Azara*, No. 410.

This species so closely resembles the *Xema ridibundum*, Boiè, that Mr. Gould observes, he should have hardly ventured to have characterized it as distinct; but as M. Vieillot and Meyen have deemed this necessary, he adopts their view. I have compared a suite of specimens, which I procured from the Rio Plata, the coast of Patagonia, and the Straits of Magellan, with several specimens of the *Xema ridibundum*; the only difference which appears to me constant, is that the primaries of the *X. cirrocephalum*, in the adult winter plumage, both of male and female, are tipped with a white spot (a character common to some other species), whereas in the *X. ridibundum* the points are black. The beak of the latter species,

especially the lower mandible, is also a little less strong, or high in proportion to its length. In the immature stage, I could perceive no difference whatever in the plumage of these birds. The proportional quantity of black and white in the primaries, given by Meyen as the essential character, varies in the different states of plumage. The specimens described by this author were procured from Chile.\* The soles of the feet of my specimens were coloured, deep "reddish orange," and the bill dull "arterial blood-red" of Werner's nomenclature.

In the plains south of Buenos Ayres I saw some of these birds far inland, and I was told that they bred in the marshes. It is well known that the black-headed gull (*Xema ridibundum*), which we have seen comes so near the *X. cirrocephalum*, frequents the inland marshes to breed. It appears to me a very interesting circumstance thus to find birds of two closely allied species preserving the same peculiarities of habits in Europe and in the wide plains of S. America. Near Buenos Ayres this gull as well as the *L. dominicanus* sometimes attends the slaughter-houses to pick up bits of meat.

*RHYNCHOPS NIGRA*. *Linn.*

I saw this bird both on the East and West coast of South America, between latitudes 30° and 45°. It frequents either fresh or salt water. Near Maldonado (in May), on the borders of a lake, which had been nearly drained, and which in consequence swarmed with small fry, I watched many of these birds flying backwards and forwards for hours together, close to its surface. They kept their bills wide open, and with the lower mandible half buried in the water. Thus skimming the surface, generally in small flocks, they ploughed it in their course; the water was quite smooth, and it formed a most curious spectacle, to behold a flock, each bird leaving its narrow wake on the mirror-like surface. In their flight they often twisted about with extreme rapidity, and so dexterously managed, that they ploughed up small fish with their projecting lower mandibles, and secured them with the upper half of their scissor-like bills. This fact I repeatedly witnessed, as, like swallows, they continued to fly backwards and forwards, close before me. Occasionally, when leaving the surface of the water, their flight was wild, irregular, and rapid; they then also uttered loud harsh cries. When these birds were seen fishing, it was obvious that the length of the primary feathers was quite necessary in order to keep their wings dry. When thus employed, their forms resembled the symbol, by which many artists represent marine birds. The tail is much used in steering their irregular course.

These birds are common far inland, along the course of the Rio Parana; and

\* The naturalists in Lutke's voyage, vol. iii. p. 255, seem to consider a gull, which they obtained at Concepcion, as the *Larus Franklinii* of North America.



it is said they remain there during the whole year, and that they breed in the marshes. During the day they rest in flocks on the grassy plains, at some distance from the water. Being at anchor in a small vessel, in one of the deep creeks between the islands in the Parana, as the evening drew to a close, one of these scissor-beaks suddenly appeared. The water was quite still, and many little fish were rising. The bird continued for a long time to skim the surface; flying in its wild and irregular manner up and down the narrow canal, now dark with the growing night and the shadows of the overhanging trees. At Monte Video, I observed that large flocks remained during the day on the mud banks, at the head of the harbour; in the same manner as those which I observed on the grassy plains near the Parana. Every evening they took flight in a straight line seaward. From these facts, I suspect, that the Rhynchops frequently fishes by night, at which time, many of the lower animals come more abundantly to the surface than during the day. I was led by these facts to speculate on the possibility of the bill of the Rhynchops, which is so pliable, being a delicate organ of touch. But Mr. Owen, who was kind enough to examine the head of one, which I brought home in spirits, writes to me, (August 7, 1837,) that—

“The result of the dissection of the head of the *Rhynchops*, comparatively with that of the head of the duck, is not what you anticipated. The facial, or sensitive branches of the fifth pair of nerves, are very small; the third division in particular, is filamentary, and I have not been able to trace it beyond the soft integument at the angles of the mouth. After removing with care, the thin horny covering of the beak, I cannot perceive any trace of those nervous expansions which are so remarkable in the lamelli-rostral aquatic birds; and which in them supply the tooth-like process, and soft marginal covering of the mandibles. Nevertheless, when we remember how sensitive a hair is, through the nerve situated at its base, though without any in its substance, it would not be safe to deny altogether, a sensitive faculty in the beak of the Rhynchops.”

M. Lesson (Manuel d'Ornithologie, vol. ii. p. 335.) has stated, that he has seen these birds opening the shells of the Mactræ, buried in the sandbanks on the coast of Chile. From their weak bills, with the lower mandible so much produced, their short legs and long wings, it seems very improbable that this can be a general habit, although it may sometimes be resorted to. Wilson, who was well acquainted with this bird, does not believe “the report of its frequenting oyster beds, and feeding on these fish.” The existence, however, of this same report in the United States, makes the question, whether the Rhynchops does not sometimes turn the peculiar structure of its beak to this purpose, worthy of further investigation.

*VIRALVA ARANEA.* *G. R. Gray.*

*Sterna aranea*, *Wils.* Am. Orn. pl. 72. f. 6.

My specimen was procured at Bahia Blanca, in Northern Patagonia. I may here observe, that many navigators have supposed that terns, when met with out at sea, are a sure indication of land. But these birds seem not unfrequently to be lost in the open ocean; thus one (*Megalopterus stolidus*) flew on board the Beagle in the Pacific, when several hundred miles from the Galapagos Archipelago. No doubt, the remark made by navigators, with respect to the proximity of land where terns are seen, refers to birds in a flock, fishing, or otherwise showing that they are familiar with that part of the sea. I, therefore, more particularly mention, that off the mouth of the Rio Negro, on the Patagonian shore, I saw a flock (probably the *Viralva aranea*) fishing seventy miles from land: and off the coast of Brazil a flock of another species, 120 from the nearest part of the coast. The latter birds were in numbers, and were busily engaged in dashing at their prey.

*MEGALOPTERUS STOLIDUS.* *Boiè.*

*Sterna stolidus*, *Linn.* Syst. i. 227.

My specimens were procured from the Galapagos Archipelago. It is well known to be an inhabitant of the seas in the warmer latitudes over the whole world. The Rocks of St. Paul's, nearly under the equator, in the Atlantic ocean, were almost covered with the rude and simple nests of this bird, made with a few pieces of sea-weed. The females were sitting upon their eggs (in February), and by the side of many of their nests, parts of flying-fish were placed, I suppose, by the male bird for his partner to feed on during the labour of incubation.

*PHALACROCORAX CARUNCULATUS.* *Stephens.*

*Phalacrocorax carunculatus*, *Steph.* Gen. Zool.

*Pelecanus carunculatus*, *Gm.* Syst. i. 576.

*Phalacrocorax imperialis*, *King*, Zool. Proc. vol. i. pt. 1. 30.

I procured a specimen of this bird at Port St. Julian, on the coast of Patagonia, where, during January, many were building. I merely mention it here, for the purpose of describing the singularly bright colours of the naked skin about its head. Skin round the eyes “campanula blue;” cockles at the base of the upper mandible, “saffron mixed with gamboge-yellow.” Marks between the eye and the corner of the mouth, “orpiment orange;” tarsi scarlet.



FREGATA AQUILA. Cuv.  
Pelecanus Aquilus, Linn.

I had an opportunity, at the Galapagos Archipelago, of watching, on several occasions, the habits of this bird, which are very interesting in relation to its peculiar structure. The Frigate bird, when it sees any object on the surface of the water, descends from a great height, in an inclined plane, head foremost, with the swiftness of an arrow; and at the instant of seizing with its long beak and outstretched neck, the floating morsel, it turns upwards, with extraordinary dexterity, by the aid of its forked tail, and long, powerful wings. It never touches the water with its wings, or even with its feet; indeed I have never heard of one having been seen on the surface of the sea; and it appears that the deeply indented web between its toes is of no more use to it, than are the shrivelled wings beneath the wing-cases of some coleopterous beetles. The Frigate bird has a noble appearance when seen soaring in a flock at a stupendous height (at which time it merits the name of the Condor of the ocean), or when many together are dashing, in complicated evolutions, but with the most admirable skill, at the same floating object. They seem to scorn to take their food quietly, for between each descent they raise themselves on high, and descend again with a swift and true aim. If the object (such as offal thrown overboard) sink more than six or eight inches beneath the surface, it is lost to the Frigate bird. I was informed at Ascension, that when the little turtles break through their shells, and run to the water's edge, these birds attend in numbers, and pick up the little animals (being thus very injurious to the turtle fishery) off the sand, in the same manner as they would from the sea.

A P P E N D I X.

Anatomical description of *Serpophaga albocoronata*, *Furnarius cunicularius*, *Uppucertbia dumetoria*, *Opetiorhynchus vulgaris*, *O. antarcticus*, *O. Patagonicus*, *Pteroptochos Tarnii*, *P. albicollis*, *Synallaxis maluroides*, *Phytotoma rara*, *Trochilus gigas*, *Tinocorus rumicivorus*.\*

BY T. C. EYTON, Esq., F.L.S., &c.

SERPOPHAGA ALBOCORONATA. Gould. (Male.)

Tongue pointed, furnished with a few short bristles at the sides near the base. Trachea with the same muscles as among the warblers generally. Æsophagus slightly funnel-shaped; proventriculus much expanded at its entrance into the gizzard, which is rounded, not very muscular, inner coat slightly hardened, smooth. Intestine of moderate size, furnished with two rudimentary cæca.

Length of œsophagus, including proventriculus.....	1	Length of intestine from gizzard to cloaca.....	3½
of gizzard .....	¾	from cæca to cloaca.....	3½
Breadth of ditto .....	5/16		

The skeleton of this bird is precisely that of the smaller and weaker species of Laniadæ.

Length of sternum .....	5	No of cervical vertebræ.....	11
Breadth anteriorly .....	3	dorsal ditto .....	7
posteriorly .....	4½	sacral ditto .....	9
Width of fissures.....	1	caudal ditto.....	6
Depth of ditto .....	1½	Total.....	33
Depth of keel .....	2		
Length of pelvis .....	5½	No. of false ribs .....	1 1 ?
Width anteriorly .....	2½	true ditto .....	5
posteriorly .....	5½	Total .....	7
Length from occiput to point of bill .....	12		
Breadth of head .....	5¾		
Length of coracoids .....	4½		

\* I am much indebted to Mr. Eyton for these observations, which greatly add to the value of the previous descriptions



FURNARIUS CUNICULARIUS. *G. R. Gray.* (Male.)

Tongue, trachea, and œsophagus, as in *Uppucerthia*. Proventriculus longer, and slightly contracted at its entrance into the gizzard, which is large, flattened, and muscular, more rounded than in *Opetiorhynchus*, lined with a rugose hardened coat, and filled with small seeds, and the remains of insects; intestines of small diameter, and furnished with two rudimentary cæca.

	inches		inches
Length of œsophagus, including proventriculus	1½	Length from gizzard to cæca	5
of gizzard	¾	cæca to cloaca	1½
Breadth of ditto	¾		

Sternum of nearly equal breadth, both posteriorly and anteriorly, but much narrowed in the middle, the portion to which the ribs are attached much elongated beyond their junction; posterior margin furnished with two deep fissures, slightly narrowed at their exit; keel deep, slightly rounded on its inferior edge, and much scalloped out anteriorly; pelvis broad and short, the os pubis projecting far backwards; the ischium terminating posteriorly in an acute process. Os furcatum thin, much arched, furnished with a flattened reflexed process at its junction with the sternum; the points of the rami bent forwards at their junction with the coracoids.

Coracoids of moderate size and length, inserted deeply into the sternum; scapula of moderate size, broader near the extremity.

	lines		
Length of sternum	11	No. of cervical vertebræ	12
Breadth anteriorly	6½	dorsal ditto	7
posteriorly	8½	sacral ditto	10
Depth of keel	4½	caudal ditto	7
Length of pelvis	12	Total	36
Width anteriorly	4½		
posteriorly	11	No. of true ribs	5
Length from occiput to point of bill	19	false ditto	2·1
Breadth of cranium	7½		
Length of coracoids	8	Total	8

UPPUCERTHIA DUMETORIA. *Geoff. & D'Orb.* (Female.)

Tongue short, compared with the length of the bill, pointed, armed with a few spines at the base; trachea of moderate size, acted upon by one pair of sterno-tracheal muscles, which go off to the sternum, about ½ of an inch above the inferior larynx; from the upper ring of the bronchiæ on each side, a process proceeds upwards to the point from which the muscles diverge, to which point only the rings of the trachea are continued, two spaces therefore, one on the anterior, the other on the posterior side of the trachea, immediately above the bronchiæ, are left devoid of osseous matter, being bounded laterally by the process above mentioned, inferiorly by the upper rings of the bronchiæ, and superiorly by the lower ring of the trachea, which is slightly enlarged; œsophagus small, slightly dilated a little above the proventriculus, which is of moderate size, and not contracted before entering the gizzard; gizzard large, oval, very muscular, inner coat hardened, deeply furrowed longitudinally, and filled with the remains of insects; intestinal canal of moderate size, without cæca; rectum very slightly enlarged; liver bilobed.

	inches		inches
Length of œsophagus, including proventriculus	2	Breadth of ditto	½
of gizzard	¾	Length of intestinal canal	10

With the exception of being larger than *Furnarius cunicularius*, and in having the bill more bent and longer, the skeleton presents no material difference from that of the above-named bird.

	lines		
Length of sternum	13	No. of cervical vertebræ	11
Breadth anteriorly	6	dorsal ditto	7
posteriorly	7½	sacral ditto	11
Depth of keel	4	caudal ditto	6
of fissures	4	Total	35
Breadth of ditto	1		
Length of pelvis	14½	No. of true ribs	5
Breadth anteriorly	4	false ditto	2·1
posteriorly	9½	Total	8
Length from occiput to point of bill	27		
Breadth of cranium	8		
Length of coracoids	11		

OPETIORHYNCHUS VULGARIS. *Gray.* (Male.)

The structure of the soft parts, both in this species of *Opetiorhynchus*, and the two following ones, so closely resemble that of *Furnarius* and *Uppucerthia*, that one description will almost serve for the whole; those differences that do exist being not more than are generally found in species of the same genus; the external characters also being slight, I cannot but doubt the propriety of separating them; the cæca are slightly developed in this species, measuring ½ inch in length.

	inches		inches
Length of œsophagus, proventriculus included	2½	Length of intestinal canal from gizzard to the cloaca	7½
of gizzard	¾	from cæca to cloaca	¾
Breadth of ditto	½		

Skeleton similar in form to that of *Furnarius cunicularius*.

	lines		
Length of sternum	11½	No. of cervical vertebræ	11
Breadth anteriorly	5½	dorsal ditto	7
posteriorly	7½	sacral ditto	11
Depth of keel	3¾	caudal ditto	7
of fissures	5	Total	36
Breadth of ditto	1½		
Length of pelvis	12¾	No. of true ribs	5
Breadth anteriorly	4	false ditto	2·1
posteriorly	9½	Total	8
Length from occiput to point of bill	17		
Breadth of cranium	7		
Length of coracoids	8½		

OPETIORHYNCHUS ANTARCTICUS. *G. R. Gray.* (Male.)

Structure of the soft parts as in *O. vulgaris*, but with the rectum of rather larger diameter, and the cæca very minute; gizzard filled with the remains of insects.

	inches		inches
Length of œsophagus, including proventriculus	2½	Breadth of gizzard	½
gizzard	¾	Length of intestinal canal from gizzard to cloaca	7



Skeleton similar in form to *Furnarius cunicularius*, and the other species of this genus.

	lines	No. of cervical vertebræ	11
Length of sternum	11	dorsal ditto	7
Breadth anteriorly	6	sacral ditto	12
posteriorly	7½	caudal ditto	7
Depth of keel	4¾	Total	37
of fissures	4		
Breadth of ditto	1¾	No. of true ribs	5
Length of pelvis	12	false ditto	2.1
Breadth anteriorly	3¾	Total	8
posteriorly	10½		
Length from occiput to point of bill	18		
Breadth of cranium	7½		
Length of coracoids	9		

OPETIORHYNCHUS PATAGONICUS. *G. R. Gray.* (Male.)

No difference in the structure of the soft parts from the other species of the genus before spoken of.

The trachea, however, does not differ from the ordinary simple form found in most birds, but differs from *O. vulgaris* and *O. antarcticus*, in having the lower rings continued to the bronchiæ; it is acted upon by one pair of muscles; no cæca are apparent.

	inches		inches
Length of œsophagus, including proventriculus	2½	Breadth of gizzard	¾
gizzard	½	Length of cutis from gizzard to cloaca	5½

Skeleton in form similar to that of *Furnarius cunicularius*, and the other species of this genus.

	lines	No. of cervical vertebræ	11
Length of sternum	13	dorsal ditto	7
Breadth anteriorly	6½	sacral ditto	9
posteriorly	8½	caudal ditto	6
Depth of keel	5	Total	33
fissures	4		
Breadth of ditto	1½	No. of true ribs	5
Length of pelvis	13½	false ditto	2.1
Breadth anteriorly	5	Total	8
posteriorly	10½		
Length from occiput to point of bill	19		
Breadth of cranium	8		
Length of coracoids	10		

Remarks:—the last five species approach so nearly, that I doubt the propriety of separating them generically. The skeletons are only distinguishable with the exception of the form of the bill, by the proportions between the different admeasurements.

PTEROPTOCHOS TARNII. *G. R. Gray.* (Female.)

Tongue pointed, armed with two strong lateral spines, and a few intermediate smaller ones at the base; œsophagus largest at the upper extremity, and gradually becoming smaller towards the proventriculus; no vestige of a craw; proventriculus of moderate size, not much contracted towards the gizzard, which is also of moderate size, and much flattened; not very muscular, and lined with a hardened coat, rugose longitudinally; the gizzard was filled with small

pebbles, and a coarse black powder, probably the remains of insects; intestinal canal small; cæca rudimental; rectum large, becoming more expanded towards the cloaca, which is also large; trachea of equal diameter throughout, furnished with one pair of sterno-tracheal muscles, a portion of each of which is continued downwards to the upper rings of the bronchiæ, on which it expands; liver two-lobed.

	inches		inches
Length of œsophagus, including proventriculus	3½	Diameter of gizzard	¾
of intestinal canal, from gizzard to cloaca	18	Length of ditto	1
of rectum	2½		

The pelvis and ribs of this bird were much damaged; sternum of equal breadth posteriorly and anteriorly, slightly contracted on its lateral edge, near the middle indented on its posterior margin with four deep fissures, the outer ones largest; a large triangular process projecting forwards between the junctions of the coracoids, bifid at the apex; the coracoids themselves very strongly articulated to the sternum, the sides of the sternum to which the ribs are articulated projecting in the form of a process far beyond the junction of the coracoids; the sternal keel is narrow, and has its edge straight; the coracoids are long, thin, with very slight external lateral processes at their junction with the sternum; os furcatum very thin, roundish, a very slight process on the point at which it approaches nearest to the sternum, very slightly arched.

Scapula broad, flattened, much widened at about one-third of its length from the hinder extremity; wing bones short, and weak; leg bones long, and strong; the fibula much developed.

	lines		lines
Length of sternum	15	Length from occiput to point of bill	22½
Greatest breadth of sternum	9½	Breadth of cranium	10½
Breadth at the narrowest part	7	Length of coracoids	11
Width of external fissure	1½	Breadth of scapula in the broadest part	2
Depth of ditto	6	Cervical vertebræ	12
Width of internal ditto	1½	Dorsal ditto	6
Depth of ditto	6½	Sacral, damaged.	
Depth of keel	3	Caudal, damaged.	

PTEROTOCHOS ALBICOLLIS. *Kittl.* (Male.)

Trachea, tongue, œsophagus, gizzard, and liver of the same form as in *Pterotochos Tarnii*. The contents of the gizzard also did not differ.

	inches		inches
Length of intestinal canal	14½	Length of gizzard	¾
from cæca to cloaca	2½	Breadth of ditto	¾

Only the body, after skinning, of the species, was brought home by Mr. Darwin.

The skeleton of this species does not differ in anything but admeasurements from that of *Pterotochos Tarnii*; the pelvis, however, being so much damaged in that species, that I was not able to make many notes upon it, I shall give a description of that part in the present one.

Pelvis of moderate size; the ossa pubis and ischium much expanded, and elongated posteriorly, and placed nearly perpendicular to the plane of the ilium, ischiatic foramina large; two large processes arise on the ilium on each side of the junction of the caudal vertebræ for the attachment of the levator muscles of the tail.







Remarks:—The skeleton and soft parts of this bird very nearly resemble those of the genus *Loxia*, but differ in their superior size, in having the fissures on the posterior margin of the sternum not so deep, and in the margin itself being straighter, the coracoids larger, and in having the process at the end of the os furcatum approaching the sternum smaller than in that genus. The ribs also are stronger.

TROCHILUS GIGAS. Vieill. (Male.)

Tongue bifid, each division pointed; hyoids very long, in their position resembling those in the *Picidae*; trachea of uniform diameter; destitute of muscles of voice; bronchia very long; œsophagus funnel-shaped, slightly contracted on approaching the proventriculus, which is small, and scarcely perceptible; gizzard small, moderately muscular, the inner coat slightly hardened, and filled with the remains of insects; intestine largest near the gizzard; I could not perceive a vestige of cæca.

	inches		inches
Length of œsophagus, including proventriculus.....	1½	Length of gizzard .....	½
intestinal canal .....	3½	Breadth of ditto .....	½

Sternum with the keel very deep, its edge rounded, and projecting anteriorly; posterior margin rounded, and destitute of indentation or fissure; the ridges to which the pectoral muscles have their attachment, large and prominent, the horizontal portion much narrowed anteriorly, consequently the junctions of the coracoids are very near together.

Pelvis short, very broad; os pubis long, curved upwards at the extremities, projecting far downwards, and posteriorly beyond the termination of the caudal vertebræ; the ischiatic foramen small, and linear; femora placed far backwards; coracoids short, very strong, their extremities much diverging; os furcatum short, slightly arched near the extremities of the rami, which are far apart, furnished with only a small process on its approach to the sternum; scapula flattened, long, broadest near the extremity; humerus, radius, and ulna short, the metacarpal bones longer than either; the former furnished with ridges much elevated for the attachment of the pectoral muscles; caudal and dorsal vertebræ with the transverse processes long, and expanded; cranium of moderate strength, the occipital portion indented with two furrows, which pass over the vertex, and in which the hyoids lie; orbits large, divided by a complete bony septum; the lachrymal bones large, causing an expansion of the bill near the nostrils.

	lines		
Length of sternum.....	13½	No. of cervical vertebræ .....	10
Breadth anteriorly .....	4	dorsal ditto .....	6
posteriorly .....	7½	sacral ditto .....	9
Depth of keel .....	6¾	caudal ditto.....	5
Length of pelvis.....	6½	Total.....	30
Width anteriorly .....	2½		
posteriorly .....	7	No. of true ribs .....	5
Length from occiput to point of bill .....	27½	false ditto.....	1·3
Breadth of cranium .....	6½	Total.....	9
Length of coracoids .....	6		

Remarks:—The skeleton of this bird does not differ in form from that of *Trochilus pella*, figured at page 270 of the Cyclopædia of Anatomy and Physiology. The whole of the group are more nearly allied to fissirostral birds than any other.

TINOCHORUS RUMICIVORUS. Eschsch. (Male.)

Trachea of uniform diameter, furnished with one pair of sterno-tracheal muscles, from which a few fibres descend on each side to the upper rings of the bronchiæ; œsophagus of large diameter to about half its length, where it is furnished with a craw, and afterwards contracted to the proventriculus; the craw where it is connected with the œsophagus is much contracted, afterwards it expands into a large sac; proventriculus small; gizzard large, and very muscular; the grinding surfaces hard, concave in the middle, and furnished with longitudinal grooves in the concave part; the intestinal canal is of moderate length, small next the gizzard, largest at the entrance of the cæca, from whence it slightly tapers to the cloaca, which is small; cæca long, of greatest diameter at the opposite extremity to their entrance into the rectum; the gizzard and œsophagus were filled with reeds, mixed with very small pebbles; liver bilobed.

			inches
Length of œsophagus from glottis to gizzard .....	3	Diameter parallel to the grinding surfaces .....	¾
from œsophagus to outer extremity of craw .....	¾	Length of intestine from gizzard to cloaca .....	13
Perpendicular diameter of craw .....	7	from cæca to cloaca .....	1½
Greatest diameter of gizzard obliquely to the grinding surfaces .....	1	of cæca .....	3

A second specimen, a female, did not differ, except in sex. Skeleton light; bones in general thin. Sternum broadest posteriorly, and indented on its posterior margin with two large fissures; keel deep, its inferior edge rounded, much scalloped out anteriorly; a moderate-size bifid manubrial process between the junction of the coracoids.

Pelvis broad, of moderate length, similar to that found among the genus *Strepsilas*. Os furcatum much arched, furnished with a small flattened process, where the ligament unites it to the sternum; coracoid of moderate length, strong, furnished with a large process externally near their junction with the sternum; ribs flattened, posterior process long, slightly curved, and narrow.

	lines		
Length of sternum .....	16	No. of cervical vertebræ .....	14
Breadth anteriorly .....	7	dorsal .....	6
posteriorly.....	11	sacral .....	12
Width of fissures.....	4	caudal .....	7
Depth of ditto.....	6	Total.....	39
keel .....	7		
Length of pelvis .....	16½	No. of true ribs .....	6
Width anteriorly.....	6	false ditto.....	2
posteriorly .....	12	Total.....	8
Length from occiput to point of bill .....	16		
Breadth of head.....	6½		
Length of coracoids .....	7½		

Remarks. The bill of this curious bird much resembles that of the genus *Glareola*, but the soft skin covering the nostrils is more developed, in which respect it resembles the quails, and other gallinaceous birds. The structure of the tarsi, feet, and nails approach near to that of *Strepsilas*, but differ in the latter being sharper, and in the scales on the feet and tarsi being more apparent, which may, perhaps, have been caused to a certain degree by the bird having been for a long while in spirits.



The wing has precisely the same structure as in *Glareola*, and some of the plovers.

The tail is more lengthened than among the plovers, but not more so than in *Glareola praticola*, which species has, however, the tail forked, but some of the same genus, as the last named bird, although it is not so long in them, have it in the same shape as in *Tinochorus*,—as *Glarecola Australis*.

The structure of the digestive organs is altogether that of a gallinaceous bird; the skeleton, however, agrees scarcely in any particular with that order, approaching closely to that of the waders. The sternum differs from any gallinaceous bird with which I am acquainted, in wanting entirely the strong lateral process, and in the fissures on the posterior margin being much smaller; the nearest approach in form which I have been able to find, is that of *Machetes*, from which, if it were not for the superior size of the latter, it could scarcely be distinguished.

The pelvis agrees so perfectly with that of *Strepsilas interpres*, and the *Charadriidæ* in general, as not to require farther remark.

The remainder of the skeleton resembles both the plovers and sandpipers.

I much regret that I have never had an opportunity of dissecting a specimen of *Glareola*, to which the genus, *Tinochorus*, appears closely allied, and I believe that they will form a connecting link between the orders *Grallatores* and *Razores*.

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*Milvago albogularis.*





*Craxirex Galapagoensis.*





*Otus Galapagoensis.*



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*Strix punctatissima.*





*Fregate modestus.*



Birds Pl. 6.



*Pyrocephalus puniceus*.



Birds. Pl. 7



*Pyrocephalus nanus.*



Birds Pl. 8.



*Tijmannula magnirostris.*



Birds. Pl. 9.



*Lichenops erythropterus.*



Birds. Pl. 10.



*Flavida Azara*



Birds. Pl. 11.

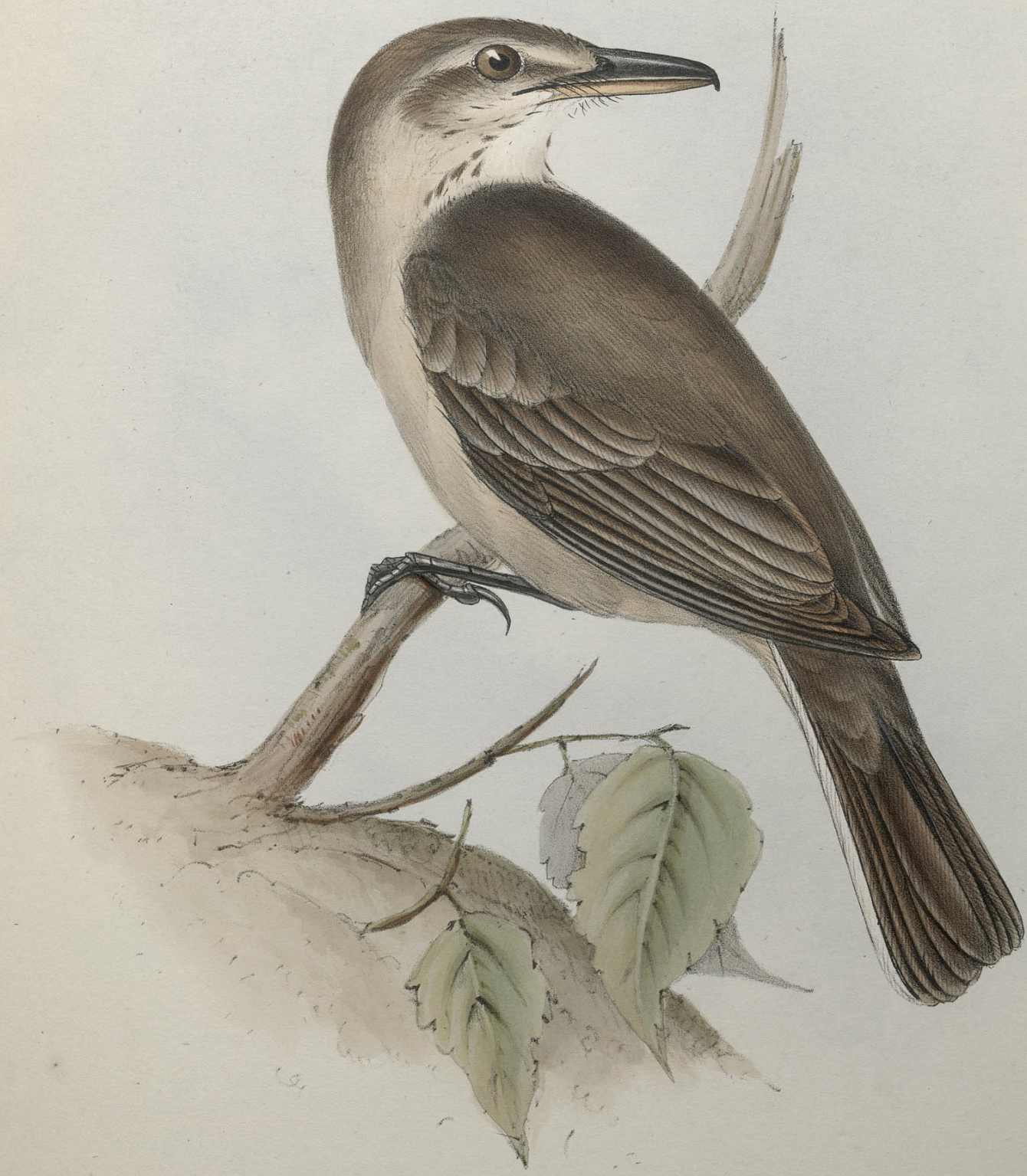


*Fregata variegata*.



Pl 12

Birds



*Agriornis micropterus.*



Birds. Pl. 4.



*Agriornis leucurus.*



Birds. Pl. 44.



*Pachyramphus albescent*





*Pachyramphus minimus.*



Birds Pl. 16.



*Mimus trifasciatus.*





*Mniotilta melanocephala*





*Mimus parvulus.*



Birds Pl. 19



*Upcerthia dumetaria.*



Birds. Pl. 20.



*Opetiorhynchus lanceolatus.*



Birds. Pl. 21.



*Eremobius phoeniceus.*



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*Synalaxis major.*



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*Synalaxis rufogularis.*



Birds Pl. 24.



*Synalaxis flavogularis.*



Birds. Pl. 25.



*Limnornis curvirostris.*



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*Limnornis rectirostris.*



Birds. Pl. 27.



*Dendrodramus leucosternus.*



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*Sylvicola aureola.*



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*Ammodramus longicaudatus*.



Birds. Pl. 30.



*Ammodramus canthornus.*



*Birds Pl. 31.*



*Passer Jagoensis.*



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*Chonospiza melanodora.*





*Chlorospiza Xanthogramma.*



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*Tanagra Darwini*



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*Pipilo personata*



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*Geospiza magnirostris*





*Geospiza strenua.*



*Birds. Pl. 38.*



*Geospiza fortis*





*Geospiza parvula*



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*Camarhynchus psittaculus.*





*Camarhynchus crassirostris.*





*Cactornis scandens.*





*Cactornis affinis*





*Certhidea olivacea.*





*Xanthornis flaviceps*





*Zenaida Galapagoensis.*





*Rhea Darwinii.*





*Lapornia notata.*



Birds Pl. 49.



*Lapornia spilota*



Birds. Pl. 50.



*Anser melanopterus.*



1597.09

THE  
ZOOLOGY  
OF  
THE VOYAGE OF H.M.S. BEAGLE,  
UNDER THE COMMAND OF CAPTAIN FITZROY, R.N.

DURING THE YEARS

1832 TO 1836.

PUBLISHED WITH THE APPROVAL OF  
THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

Edited and Superintended by  
CHARLES DARWIN, ESQ. M.A. F.R.S. F.G.S., Etc.  
NATURALIST TO THE EXPEDITION.

PART IV.

FISH,

BY  
THE REV. LEONARD JENYNS, M.A., F.L.S., &c.

LONDON:  
PUBLISHED BY SMITH, ELDER, AND CO. 63, CORNHILL.  
MDCCCXLII.



THE VOYAGE OF H.M.S. BEAGLE

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INTRODUCTION.

THE number of species of Fish described or noticed in the following Part of the Zoology of the Beagle, amount to 137. It is right to observe that, judging from Mr. Darwin's manuscript notes, relating to what he obtained in this department, this is probably not more than half the entire number which he collected. Unfortunately a large portion of the valuable collection sent home by him arrived in this country in too bad condition for examination, and was necessarily rejected.

The localities visited by Mr. Darwin, and at every one of which more or fewer species of fish were obtained, were the Cape Verde Islands,—the coast of Brazil, including the mouth of the Plata, together with several inland rivers and streams in that district,—the coasts of Patagonia, and the Santa Cruz river,—Tierra del Fuego and the Falkland Islands,—the Archipelago of Chiloe,—the coasts of Chile and Peru,—the Galapagos Archipelago,—Tahiti,—New Zealand, King George's Sound in Australia,—and, lastly, the Keeling Islands in the Indian Ocean. The great bulk of the species, however, are from the coasts, east and west, of South America.

The particular locality assigned to each species respectively in the following work may be relied upon as correct; pains having been taken by Mr. Darwin to affix a small ticket of tin, with a number stamped upon it, to each specimen, and to enter a note immediately in the manuscript catalogue, having the same number attached. In only three or four instances these tickets were found wanting, on the arrival of the collection in this country.

A considerable portion of the species examined and described are new to science, especially of those collected in South America, and the adjoining Islands and Archipelagos. The new ones are supposed to amount to seventy-five at least, constituting more than half the entire number; and amongst these are apparently seven new genera.

a



It may be interesting to state more particularly from what localities the new species principally come, and what proportion they bear to the *entire* number brought from each of those localities. Thus from Brazil *about half* are considered new;—from Patagonia *at least half*;—from Tierra del Fuego, the Falkland Islands, and the Galapagos Archipelago, *all are new*, without exception; and *nearly all* from Chiloe, and the coasts of Chile and Peru. Of the species brought from Tahiti, New Holland, and the Indian Ocean, not above *one-fourth* are new. This might have been anticipated from the better knowledge which we have of the Ichthyology of that quarter of the globe, than of South America.

It is much to be regretted that the portion of the collection which has been lost to science, was obtained in localities most abounding in novelties, judging from that portion of it which has been saved. Thus, not above five or six species will be found noticed in the following work, from Tierra del Fuego, where Mr. Darwin took especial pains to collect all he could, and, judging from his manuscript catalogue, he must probably have obtained between thirty and forty. From the Falkland Islands again, there have been only saved two out of fifteen or sixteen,—from the coasts of Chile and Peru, not half the entire number obtained, and not above half from the coasts of Patagonia.

There is also described not above half the species brought from King George's Sound, and the Keeling Islands; but as the Indian and Australian species, or at least the former, have been more frequently brought to Europe than the South American, they are less to be regretted than these last.

It is fortunate that *the whole* of the species obtained by Mr. Darwin in the Galapagos Archipelago, amounting to fifteen, have been preserved, and are described in the following pages.

It may now be useful to mention, to what groups principally—first, the entire number of described species belong, and, secondly, that portion of them which are considered new. Both these points will be best judged of from the following table, in which the whole collection is parcelled out according to the families.

ACANTHOPTERYGII.			
PERCIDEÆ. Entire No. of species	18	whereof new	11
MULLIDÆ . . . . .	3		
TRIGLIDÆ . . . . .	3	1	
COTTIDÆ . . . . .	2	2	
SCORPENIDÆ . . . . .	4	2	
SCIÆNIDÆ . . . . .	10	5	
SPARIDÆ . . . . .	1	1	
MENIDÆ . . . . .	2		
CHÆTODONTIDÆ . . . . .	2		
	45	22	
Brought up . . . . .	45		22
SCOMBRIDÆ . . . . .	7		3
TEUTHYDIDÆ . . . . .	2		
ATHERINIDÆ . . . . .	3		2
MUGILIDÆ . . . . .	3		
BLENNIDÆ . . . . .	11		7
GOBIDÆ . . . . .	3		2
LABRIDÆ . . . . .	7		5
LOPHIDÆ . . . . .	1		
TOTAL . . . . .	82		TOTAL, NEW 41

MALACOPTERYGII.			
SILURIDÆ. Entire No. of species	3	whereof new	2
CYPRINIDÆ . . . . .	7	6	
ESOCIDÆ . . . . .	1		
SALMONIDÆ . . . . .	8	7	
CLUPEIDÆ . . . . .	5	5	
PLEURONECTIDÆ . . . . .	6	1	
	30	21	
			[probably more.]
Brought up . . . . .	30		21
CYCLOPTERIDÆ . . . . .	2		2
ECHENEIDIDÆ . . . . .	1		
ANGUILLIDÆ . . . . .	6		2
			[perhaps more.]
TOTAL . . . . .	39		TOTAL, NEW 25

LOPHOBRANCHII.			
SYNGNATHIDÆ. Entire No. of species	3	whereof new	3

PLECTOGNATHI.			
TETRODONTIDÆ. Entire No. of species	7	whereof new	4
BALISTIDÆ . . . . .	5		1
TOTAL . . . . .	12		TOTAL, NEW 5

CYCLOSTOMI.			
PETROMYZONIDÆ. Entire No. of species	1	whereof new	1

TOTAL IN THE SEVERAL ORDERS.			
ACANTHOPTERYGII. Entire No. of species	82	whereof new	41
MALACOPTERYGII . . . . .	39		25
LOPHOBRANCHII . . . . .	3		3
PLECTOGNATHI . . . . .	12		5
CYCLOSTOMI . . . . .	1		1
GRAND TOTAL . . . . .	137		GRAND TOTAL, NEW 75

It appears from the above table that of the entire number of species, three-fifths belong to the Acanthopterygian fishes,—rather more than one-fourth to the Malacopterygian,—and about one-eighth to the remaining orders united.

In the Acanthopterygians, the *new* species amount to one-half; in the Malacopterygians, to about two-thirds; in the remaining orders together, to rather more than one-half.

Looking, therefore, to the entire number of species described, the Acanthopterygians prevail; and it is in the same order that there are most new ones: but looking to the proportion, which in each order the new ones bear to the entire number, it is among the Malacopterygians that this proportion will be found highest.

Restricting our view, it will be also seen, in the Malacopterygians, that the new species are relatively most numerous in the fresh-water groups, such as the *Siluridæ*, the *Cyprinidæ*, and *Salmonidæ*, in which three families taken together,



they amount to five-sixths of the whole. The *Clupeidæ* are an exception, in which all the species are apparently new.

All the species described, belonging to the three families above mentioned, in which there are so many new, viz. the *Siluridæ*, the *Cyprinidæ*, and *Salmonidæ*, are from South America, and the Falkland Islands, excepting one from New Zealand.

Of the remaining fresh-water fishes in the collection, three out of five are presumed to be new. One of these is a species of *Perca*, from the Santa Cruz river, in South Patagonia; the second is a species of *Dules*, from the river Matavai, in Tahiti; the third a species of *Atherina*, from Valparaiso. Perhaps, however, this last is not strictly an inland species.

The entire number of fresh-water species in the collection is twenty-three, and the entire number of new ones amongst these is eighteen. The large proportion of these latter is a circumstance in confirmation of a remark which Cuvier has somewhere made, that the fresh-water fishes of foreign countries are much less known and understood than those found on the coasts. It may serve also as a hint to future travellers.

The seven new genera in the collection belong—one to the *Sciænidae*, from the Galapagos Archipelago;—one to the *Scombridae*, from North Patagonia;—three to the *Blennidae*, whereof one is from the Archipelago of Chiloe, the second from the Falkland Islands, and the third from New Zealand;—one to the *Cyprinidae*, embracing three species, from South Patagonia, Tierra del Fuego, and New Zealand; and, lastly, one to the *Salmonidae*, embracing two species from the Falkland Islands and Tierra del Fuego respectively.

It has been already mentioned, that all the species obtained by Mr. Darwin in the Galapagos Archipelago have been preserved. As they are likewise all new, and those islands appear to have been scarcely visited by any naturalist previously, it may be interesting to enumerate the several genera to which they belong, and the number of species in each genus respectively.

SERRANUS . . . . 3 species.	Fam. PERCIDÆ.	}	ACANTHOPTERYGII.
PRIONOTUS . . . . 1 "	— TRIGLIDÆ.		
SCORPÆNA . . . . 1 "	— SCORPÆNIDÆ.		
PRIONODES <i>N.G.</i> 1 "	— SCIÆNIDÆ.		
PRISTIPOMA . . . . 1 "		}	MALACOPTERYGII.
LATILUS . . . . . 1 "			
CHRYSOPHRYS . . 1 "	— SPARIDÆ.		
GOBIOUS . . . . . 1 "	— GOBIDÆ.		
COSSYPHUS . . . . 1 "	— LABRIDÆ.		
GOBIESOX . . . . . 1 "	— CYCLOPTERIDÆ.		
MURÆNA . . . . . 1 "	— ANGUILLIDÆ.		
TETRODON . . . . 2 "	— TETRODONTIDÆ.	}	PLECTOGNATHI.

In making the foregoing estimates, as regards the number of new species brought home by Mr. Darwin, I have been guided almost entirely by my own judgment. The difficulty, however, of ascertaining, in a miscellaneous collection of this nature, brought from various localities, what *are* really new to science, is very great; and this difficulty is much increased, where an author is situate apart from large public museums to which he might have recourse for comparison. Possibly, therefore, some of those described as new in the following work, may not be so in reality; and, in one instance, as mentioned in the Appendix, this is known to be the case. My excuse, however, must rest upon what has been just stated. It is hoped that caution has been generally shown, at least in regard to specimens not in a good state of preservation; and, in several such cases, in which an accurate description was hardly practicable,—though they could not be referred to any known species,—they are not positively declared new, nor any names imposed upon them whatever.

I have, of course, consulted throughout the invaluable volumes of Cuvier and Valenciennes, so far as they have yet advanced in the subject; and in them it will be found that a few species, brought by Mr. Darwin from South America, and still but little known, had nevertheless been previously obtained from the same country by M. Gay. The zoological atlases of the three great French voyages by Freycinet, Duperrey and D'Urville have been also carefully looked through; and, in regard particularly to the fish of South America, the works of Humboldt, Spix and Agassiz, and the more recent one, now in course of publication, by M. D'Orbigny.

There is an equal difficulty felt by every naturalist at the present day, in distinguishing species from varieties. And in the case of Fish, residing in a peculiar element, and so much removed from our observation,—we are almost at a loss to know, at present, to what extent their characters may be modified by local and accidental causes, or how far we may trust a different geographical position for giving permanence and value to a slight modification of form different from what occurs in the species of our own seas. Still less easy is it to determine the true importance of characters, in instances in which it is only permitted to see a single specimen of the kind, or, at most, very few individuals.

Many mistakes, therefore, are liable to occur, in a work of this nature, arising from the above sources. The only way to prevent their creating any permanent confusion in the science, is to describe all species of which the least doubt is entertained, in such detail, and with such accuracy, that they may not fail of being recognized by any observer, to whom they may occur a second time. They will not then *continue to hold a false position* in the system, as *spurious*



species. They may not be new, or they may not be species at all,—but they will be *known*; and any mistake which has been committed will be at once rectified,—any new name which has been wrongly imposed, immediately degraded to a synonym.

Accordingly I have been careful in this respect; and I have in some instances, given full descriptions, even of species which are certainly not new, but which I did not find described by previous authors with all the detail that was requisite for completely identifying them; or, leaving out what they have noticed, I have added such characters as they have omitted. My main object has been to render all the species, whether rightly named or not, easily recognizable; and, however little the science may be advanced by what is brought forward, to make that advance, so far as it goes, sure.

The method of description, and the mode of computing the fin-ray formula, will be found conformable to the plan adopted in the “*Histoire des Poissons*” of Cuvier and Valenciennes; a work which, in so many respects, must always serve as a model to labourers in this department of zoology.

The colours, in the great majority of instances, were, fortunately, noticed by Mr. Darwin in the recent state. The nomenclature employed by him for the purpose is that of Patrick Syme; and he informs me, that a comparison was always made with the book in hand, previous to the exact colour in any case being noted. Where I have observed any markings left unnoticed by Mr. Darwin, I have added them myself; and, in most instances, I have given the general disposition of the colours as they appear in spirits, from the circumstance of their being often so much altered by the liquor, and liable to mislead those, who have only the opportunity of seeing them in preserved specimens. This is what Cuvier and Valenciennes have frequently done in their work; and from them I have borrowed the practice.

In a work of this nature, it has not been thought desirable to enter into any discussion of the principles of scientific arrangement, or to effect any change in systems already received; its main object being the description of species. For this reason, I have taken the groups almost exactly as they stand in the “*Histoire des Poissons*” of Cuvier and Valenciennes, or in the “*Regne Animal*” of the former: yet there is reason to believe that many parts of their system will be found hereafter to require some modification, especially in regard to families and genera which have for their distinctive character the presence or absence of vomerine or palatine teeth. The small value which is to be attached to such character is pointed out in some instances in the following work, and much dwelt upon.

In conclusion, it may be stated, that the whole of the species in the collection of fish brought home by Mr. Darwin, described in the following pages, have been deposited by him in the Museum of the Philosophical Society of Cambridge. They are mostly in spirit, and, generally speaking, in a good state of preservation; some few, however, are in the state of skins only, and have been mounted.

L. JENYNS.

*Swaffham Bulbeck,*  
*Jan. 8, 1842.*



SYSTEMATIC TABLE OF SPECIES,  
WITH THEIR RESPECTIVE HABITATS.

ACANTHOPTERYGII.

PERCIDÆ.	
<i>Perca lævis, Jen.</i> . . . .	South Patagonia.
<i>Serranus albo-maculatus, Jen.</i> . .	Galapagos Archipelago.
— <i>Goreensis, Val.?</i> . . .	Cape Verde Islands.
— <i>aspersus, Jen.</i> . . . .	Ditto.
— <i>labriformis, Jen.</i> . . .	Galapagos.
— <i>olfax, Jen.</i> . . . .	Ditto.
<i>Plectropoma Patachonica, Jen.</i> . .	North Patagonia.
<i>DiaCOPE marginata, Cuv.</i> . . .	Keeling Islands.
<i>Arripis Georgianus</i> . . . .	King George's Sound.
<i>Aplodactylus punctatus, Val.</i> . .	
<i>Dules Auriga, Cuv. et Val.</i> . . .	Maldonado.
— <i>Leuciscus, Jen.</i> . . . .	Tahiti.
<i>Helotes octolineatus, Jen.</i> . . .	King George's Sound.
<i>Aphritis undulatus, Jen.</i> . . .	Archipelago of Chiloe.
— <i>porosus, Jen.</i> . . . .	Central Patagonia.
<i>Pinguipes fasciatus, Jen.</i> . . .	North Patagonia.
— <i>Chilensis, Val.</i> . . . .	Valparaiso.
<i>Percophis Brasilianus, Cuv.</i> . . .	North Patagonia.

MULLIDÆ.	
<i>Upeneus flavo-lineatus, Cuv. et Val.</i>	Keeling Islands.
— <i>trifasciatus, Cuv.</i> . . .	Tahiti.
— <i>Prayensis, Cuv. et Val.?</i>	Cape Verde Islands.

TRIGLIDÆ.	
<i>Trigla Kumu, Less. et Garn.</i> . . .	New Zealand.
<i>Prionotus punctatus, Cuv.</i> . . .	Rio de Janeiro.
— <i>Miles, Jen.</i> . . . .	Galapagos.

COTTIDÆ.	
<i>Aspidophorus Chilensis, Jen.</i> . .	Chiloe.
<i>Platycephalus inops, Jen.</i> . . .	King George's Sound.

SCORPENIDÆ.	
<i>Scorpena Histrio, Jen.</i> . . . .	Galapagos.
<i>Sebastes oculata, Val.?</i> . . . .	Valparaiso.
<i>Agriopus hispidus, Jen.</i> . . . .	Archipelago of Chiloe.
<i>Apistus</i> — <i>?</i> . . . .	King George's Sound.

SCIENIDÆ.	
<i>Otolithus Guatucupa, Cuv. et Val.</i>	Maldonado.
— <i> analis, Jen.</i> . . . .	Coast of Peru.
<i>Corvina adusta, Agass.</i> . . . .	Maldonado.
<i>Umbrina arenata, Cuv. et Val.</i> . .	North Patagonia.
— <i> ophicephala, Jen.</i> . . .	Coquimbo.
<i>Prionodes fasciatus, Jen.</i> . . .	Galapagos.
<i>Pristipoma cantharinum, Jen.</i> . .	Ditto.
<i>Latilus jugularis, Val.</i> . . . .	Valparaiso.
— <i> princeps, Jen.</i> . . . .	Galapagos.
<i>Heliases Crusma, Val.</i> . . . .	Valparaiso.

SPARIDÆ.	
<i>Chrysophrys taurina, Jen.</i> . . .	Galapagos.

MENIDÆ.	
<i>Gerres Gula, Cuv. et Val.?</i> . . .	Rio de Janeiro.
— <i>Oyena, Cuv. et Val.?</i> . . .	Keeling Islands.

CHÆTODONTIDÆ.	
<i>Chaetodon setifer, Bl.</i> . . . .	Keeling Islands.
<i>Stegastes imbricatus, Jen.</i> . . .	Cape Verde Islands.

SCOMBRIDÆ.	
<i>Paropsis signata, Jen.</i> . . . .	North Patagonia.
<i>Caranx declivis, Jen.</i> . . . .	King George's Sound.
— <i> torvus, Jen.</i> . . . .	Tahiti.

b



SCOMBRIDÆ—*continued*.

Caranx Georgianus, *Cuv. et Val.* King George's Sound.  
 Seriola bipinnulata, *Quoy et Gaim.* Keeling Islands.  
 Psenes —? . . . . . South Atlantic Ocean.  
 Stromateus maculatus, *Cuv. et Val.?* Chiloe.

## TEUTHYDIDÆ.

Acanthurus triostegus, *Bl. Schn.* Keeling Islands.  
 ——— humeralis, *Cuv. et Val.* Tahiti.

## ATHERINIDÆ.

Atherina argentinensis, *Cuv. et Val.?* Maldonado.  
 ——— microlepidota, *Jen.* . . . Valparaiso.  
 ——— incisa, *Jen.* . . . . North Patagonia.

## MUGILIDÆ.

Mugil Liza, *Cuv. et Val.?* . . . North Patagonia.  
 ———? . . . . . Keeling Islands.  
 Dajaus Diemensis, *Richards.* . . King George's Sound.

## BLENNIDÆ.

Blennius palmicornis, *Cuv. et Val.* Cape Verde Islands.  
 Blennechis fasciatus, *Jen.* . . . Concepcion.  
 ——— ornatus, *Jen.* . . . Coquimbo.  
 Salaris atlanticus, *Cuv. et Val.* Cape Verde Islands.

BLENNIDÆ—*continued*.

Salaris quadricornis, *Cuv. et Val.?* Keeling Islands.  
 ——— vomerinus, *Cuv. et Val.?* Cape Verde Islands.  
 Clinus crinitus, *Jen.* . . . . Coquimbo.  
 Acanthoclinus fuscus, *Jen.* . . . New Zealand.  
 Tripterygion Capito, *Jen.* . . . New Zealand.  
 Iluocetes fimbriatus, *Jen.* . . . Archipelago of Chiloe.  
 Phucocetes latitans, *Jen.* . . . Falkland Islands.

## GOBIDÆ.

Gobius lineatus, *Jen.* . . . . Galapagos.  
 Gobius ophicephalus, *Jen.* . . Archipelago of Chiloe.  
 Eleotris Gobioides, *Val.* . . . New Zealand.

## LOPHIDÆ.

Batrachus porosissimus, *Cuv. et Val.?* Bahia Blanca.

## LABRIDÆ.

Cossyphus Darwini, *Jen.* . . . Galapagos.  
 Cheilio ramosus, *Jen.* . . . Japan?  
 Chromis facetus, *Jen.* . . . Maldonado.  
 Searus chlorodon, *Jen.* . . . Keeling Islands.  
 ——— globiceps, *Cuv. et Val.* . . Tahiti.  
 ——— lepidus, *Jen.* . . . . Tahiti.  
 ———? . . . . . Keeling Islands.

## MALACOPTERYGII.

## SILURIDÆ.

Pimelodus gracilis, *Val.?* . . . Rio de Janeiro.  
 ——— exsudans, *Jen.* . . . Ditto?  
 Callichthys paleatus, *Jen.*

## CYPRINIDÆ.

Pœcilia unimaculata, *Val.* . . . Rio de Janeiro.  
 ——— decem-maculata, *Jen.* . . Maldonado.  
 Lebias lineata, *Jen.* . . . . Ditto.  
 ——— multidentata, *Jen.* . . . Monte Video.  
 Mesites maculatus, *Jen.* . . . South Patagonia.  
 ——— alpinus, *Jen.* . . . . Tierra del Fuego.  
 ——— attenuatus, *Jen.* . . . . New Zealand.

## ESOCIDÆ.

Exocoetus exsiliens, *Bl.?* . . . Pacific Ocean.

## SALMONIDÆ.

Tetragonopterus Abramis, *Jen.* . Rio Parana, S. America.  
 ——— rutilus, *Jen.* . . . Ditto.  
 ——— scabripinnis, *Jen.* Rio de Janeiro.  
 ——— tæniatus, *Jen.* . . Ditto.  
 ——— interruptus, *Jen.* Maldonado.

SALMONIDÆ—*continued*.

Hydrocyon Hepsetus, *Cuv.* . . Maldonado.  
 Aplochiton Zebra, *Jen.* . . . Falkland Islands.  
 ——— tæniatus, *Jen.* . . . Tierra del Fuego.

## CLUPEIDÆ.

Clupea Fuegensis, *Jen.* . . . Tierra del Fuego.  
 ——— arcuata, *Jen.* . . . . Bahia Blanca.  
 ——— sagax, *Jen.* . . . . Lima.  
 Alosa pectinata, *Jen.* . . . North Patagonia.  
 Engraulis ringens, *Jen.* . . . Coast of Peru.

## PLEURONECTIDÆ.

Platessa Orbignyana, *Val.?* . . Bahia Blanca.  
 ———? . . . . . King George's Sound.  
 Hippoglossus Kingii, *Jen.* . . Valparaiso.  
 Rhombus ———? . . . . . Bahia Blanca.  
 Achirus lineatus, *D'Orb.* . . Coast of Brazil.  
 Plagusia ———? . . . . . Coast of Patagonia.

## CYCLOPTERIDÆ.

Gobiesox marmoratus, *Jen.* . . Archipelago of Chiloe.  
 ——— pœcilophthalmos, *Jen.* Galapagos.

## ECHENEIDIDÆ.

Echeneis Remora, *Linn.* . . . Atlantic Ocean.

## ANGUILLIDÆ.

Anguilla australis, *Richards.* . . New Zealand.  
 Conger punctus, *Jen.* . . . . Tierra del Fuego.

ANGUILLIDÆ—*continued*.

Muræna lentiginosa, *Jen.* . . . Galapagos.  
 ——— ocellata, *Agass.* . . . Rio de Janeiro.  
 ———? . . . . . Cape Verde Islands.  
 ———? . . . . . Tahiti.

## LOPHOBRANCHII.

## SYNGNATHIDÆ.

Syngnathus acicularis, *Jen.* . . Valparaiso.  
 ——— conspicillatus, *Jen.* . Tahiti.  
 ——— crinitus, *Jen.* . . . Bahia Blanca.

## PLECTOGNATHI.

## TETRODONTIDÆ.

Diodon nycthemerus, *Cuv.* . . .  
 ——— rivulatus, *Cuv.* . . . Maldonado.  
 ——— antennatus, *Cuv.?* . . . Bahia Blanca.  
 Tetradon aerostaticus, *Jen.*  
 ——— implutus, *Jen.* . . . Keeling Islands.  
 ——— annulatus, *Jen.* . . . Galapagos.  
 ——— angusticeps, *Jen.* . . Ditto.

## BALISTIDÆ.

Balistes Vetula, *Bl.* . . . . South Atlantic Ocean.  
 ——— aculeatus, *Bl.* . . . . Tahiti.  
 Aleuterus maculosus, *Richards.* . King George's Sound.  
 ——— velutinus, *Jen.* . . . Ditto.  
 Ostracion punctatus, *Schn.* . . Tahiti.

## CYCLOSTOMI.

## PETROMYZONIDÆ.

Myxine australis, *Jen.* . . . . Tierra del Fuego.



# LIST OF PLATES.

Plate I.	Perca lævis.	Plate	Fig. 1. Pœcilia decem-maculata. Twice nat. size.
II.	Serranus albo-maculatus.		— 1 a. Ditto. Nat. size.
III.	— labriformis.		— 2. Lebias lineata.
IV.	— olfax.	XXII.	— 2 a. Ditto. Teeth magnified.
V.	Pinguipes fasciatus.		— 3. Lebias multidentata.
VI.	Prionotus Miles.		— 3 a. Ditto. Teeth magnified.
	Fig. 1. Aspidophorus Chiloensis. Twice Nat. size.		— 4. Mesites maculatus.
	— 1 a. Ditto. Nat. size. Dorsal view.		— 5. — attenuatus.
	— 1 b. Ditto. Ditto. Side view.		— 1. Tetragonopterus Abramis.
VII.	— 2. Agriopus hispidus. Twice Nat. size.		— 1 a. Ditto. Mouth magnified, to show form of maxillary.
	— 2 a. Ditto. Nat. size.		— 2. Tetragonopterus rutilus.
	— 2 b. Ditto. Portion of the hispid cuticle magnified.	XXIII.	— 2 a. Ditto. Mouth magnified.
VIII.	Scorpaena Histrio.		— 3. Tetragonopterus scabripinnis.
IX.	Fig. 1. Prionodes fasciatus.		— 3 a. Ditto. Mouth magnified.
	— 2. Stegastes imbricatus.		— 4. Tetragonopterus interruptus.
X.	Pristipoma cantharinum.		— 4 a. Ditto. Mouth magnified.
XI.	Latilus princeps.		— 1. Aplochiton Zebra.
XII.	Chrysophrys taurina.		— 1 a. Ditto. Magnified view of anal and generative orifices.
XIII.	Paropsis signata.	XXIV.	— 2. Aplochiton tæniatus.
XIV.	Caranx declivis.		— Alosa pectinata.
XV.	— torvus.		a. — Magnified scale from nape.
	Fig. 1. Atherina microlepidota.	XXVI.	Hippoglossus Kingii.
	— 1 a. Ditto. Magnified scales.		— 1. Gobiesox marmoratus.
	— 1 b. —		— 1 a. Ditto. Dorsal view.
XVI.	— 2. Atherina incisa. Nat. size.		— b. Ditto. Under side.
	— 2 a. Ditto. Magnified scale.		— 2. Gobiesox pœcilophthalmos.
	— 2 b. Ditto. Twice Nat. size.	XXVII.	— 2 a. Ditto. Lateral view.
	Fig. 1. Blennechis fasciatus.		— 2 b. Ditto. Magnified view of teeth.
	— 1 a. Ditto. Teeth magnified.		— 3. Syngnathus acicularis.
XVII.	— 2. Blennechis ornatus.		— 4. — conspicillatus.
	— 3. Salaria vomerinus.		— 5. — crinitus.
XVIII.	Fig. 1. Clinus crinitus.	XXVIII.	Tetrodon angusticeps.
	— 2. Acanthoclinus fuscus.		a. — Dorsal view of head.
	Fig. 1. Tripterygion Capito.		— 1. Aphritis undulatus.
	— 2. Gobius lineatus.		— 2. Iluocetes fimbriatus.
XIX.	— 2 a. Ditto. Dorsal view.	XXIX.	— 2 a. Ditto. Magnified view of teeth.
	— 3. Gobius ophicephalus.	Append.	— 3. Phucocetes latitans.
	— 3 a. Ditto. Dorsal view.		— 3 a. Ditto. Teeth.
XX.	Cossyphus Darwini.		
XXI.	Scarus chlorodon.		

# F I S H.

## ACANTHOPTERYGII.

### FAMILY—PERCIDÆ.

#### PERCA LÆVIS. Jen.

#### PLATE I.

*P. nigricanti-fusco undique punctata; vertice, fronte, rostro usque ad nares, et infra-orbitalium parte posteriori, squamatis; squamis, in capite ciliatis scabris, in corpore sublævibus.*

B. 7; D. 9—1/11; A. 3/9; C. 17; P. 15; V. 1/5.

LONG. unc. 11; lin. 5.

FORM.—Much more elongated than the common *Perch*, with the back less elevated. Depth, beneath the commencement of the first dorsal, not quite equalling one-fifth of the entire length. Thickness, in the region of the pectorals, about two-thirds of the depth. Head not quite one-fourth of the entire length. Profile falling gently from the nape in nearly a straight line at an angle of about 45°: at the nape the dorsal line rises so as to interrupt its continuity with the slope of the profile, but it is nearly horizontal along the base of the dorsal fins. The jaws are nearly equal, but when the mouth is closed, the upper one appears somewhat the longer. A band of velutine teeth in each jaw, as well as on the vomer and palatines. Maxillaries when at rest nearly concealed beneath the suborbital bones: these last with their lower margin distinctly denticulated; their surface presenting several small hollows. Eyes rather above the middle of the cheeks, and about equi-distant from the extremity of the snout and the posterior margin of the preopercle; their diameter is one-sixth of the length of the head; the distance from one to the other equals one diameter and a half. Nostrils double, a little in advance of the eyes; the first orifice oval, the second round. Preopercle rectangular, with the angle rounded;

B



the ascending margin finely denticulated, the teeth almost disappearing at the top; towards the angle the teeth become stronger and point downwards; they are also stronger and more scattered along the basal margin, inclining here a little forwards. Opercle with two flat sharp points, one a little below the upper angle, the other about the middle and terminating the gill cover. Both the subopercle and interopercle have their margins obscurely denticulated: the margin of the former is rather sinuous, and passes obliquely forwards and downwards to form a continuous curve with that of the latter. Crown, forehead, upper part of the snout as far as the connecting line of the nostrils, posterior half of the suborbitals, cheeks, and all the pieces of the gill cover, excepting the lower limb of the preopercle, covered with small scales, which are in most instances ciliated with a varying number of denticles, and feel rough to the touch: the extremity of the snout, anterior portion of the suborbitals, maxillaries, and lower jaw are naked. Above each orbit is a small semi-circular granulated plate, with the granulations disposed in striæ. The suprascapulars terminate in an obtuse projecting point. The humeral bone forms a large osseous triangular plate above the pectorals, the salient angle terminating in three small teeth. Course of the lateral line a little above one-third of the depth till it arrives beneath the second dorsal, where it bends down to half the depth. Scales on the body larger than those on the head, of an oblong form, rounded at their free edges, which are scarcely at all ciliated, and for the most part quite smooth to the touch; their concealed portion not wider than the free, with a fan of fourteen striæ; the rest of their surface more finely striated. The first dorsal commences a little beyond a vertical line from the termination of the humeral plate, and is almost continuous with the second, being only separated by a deep notch; the space occupied by the two dorsals together is exactly one-third of the entire length: spines strong; the first scarcely more than one-third the length of the second, which is very little shorter than the third; this last longest, equalling rather more than half the depth; rest of the spines gradually decreasing to the last, which is of the same length as the first. The second dorsal commences with a slender spine, not half the length of the first soft ray, which last is simple, the others being branched; third and fourth soft rays longest; the succeeding ones slowly decreasing to the last, which is rather more than half the longest. Anal preceded by three spines, the first of which is very short; second much longer and very stout; third of about the same length as the second, but much slenderer; the first and second separated by a wide membrane from the third, which is closely united to the first soft ray; these last longer than those of the second dorsal, but in other respects similar. The anal and second dorsal terminate in the same vertical line; and the last ray is double in both fins. Between them and the caudal is a space equalling one-fifth of the entire length. The caudal is slightly notched. The pectorals are rather pointed, their length equalling two-thirds that of the head. Ventrals immediately beneath them, and of about the same length; the first soft ray longest, and more than twice the length of the spine which precedes it.

COLOUR.—In spirits this fish appears yellowish brown, deepening on the back but becoming paler on the belly, and covered all over with small dusky spots, one occupying the base of each scale.

Habitat, Santa Cruz River, Patagonia.

No true perch had been obtained from South America until M. D'Orbigny discovered one in the Rio-Negro, in North Patagonia, which has been since described by Valenciennes, under the name of *P. trucha*.\* The present species was found dead by Mr. Darwin, high up the river of Santa Cruz, in South Patagonia. It is evidently very closely allied to the *P. trucha*, and is spotted in a similar manner; but it appears to differ in the scales not advancing on the snout beyond the nostrils, or covering more than the posterior half of the suborbitals. Those on the body are also particularly characterized by being so smooth, as hardly to communicate any sensation of roughness when the hand is passed from the tail towards the head, though the head itself is rough. This circumstance has suggested the specific name. This species further disagrees with the one above alluded to in having the caudal slightly forked, not rounded; and in having two soft rays less in the second dorsal, and one less in the anal. Valenciennes's description, however, of the *P. trucha* is very brief; on which account I have been the more minute in that of the *P. lævis*.

This perch, with *P. trucha*, would almost seem to form a subordinate division in the genus, distinguished from that embracing all the other described species, by the character of the scales covering a large portion of the head which gives it a remarkable sciænoid appearance. Both species may be known from all the North American perches, by their having the body spotted instead of banded, and by the smaller number of rays in the first dorsal. In this last character they agree with the *P. ciliata*, and *P. marginata* of Cuvier and Valenciennes.

# 1. SERRANUS ALBO-MACULATUS. Jen.

## PLATE II.

*S. lateribus maculis albis serie longitudinali dispositis; dentibus velutinis; paucis, hic et illic sparsis, fortioribus, aculeiformibus, vel sub-conicis; preoperculo margine ascendenti convexiusculo, denticulato; denticulis ad et infra angulum paulò majoribus; operculo mucronibus duobus parvis, et spinâ intermediâ forti, armato; rostro et maxillis nudis; squamis corporis leviter ciliatis; pinna caudali æquali.*

B. 7; D. 10/13; A. 3/7; C. 17, &c.—P. 17; V. 1/5.

LONG. unc. 16; lin. 9.

FORM.—Of an oblong-oval form, with the greatest depth about one-fourth of the entire length. The dorsal and ventral lines are of nearly equal curvature. The profile is nearly rectilineal,

\* *Hist. des Poiss.* tom. ix. p. 317. I refer to the quarto edition throughout.



falling very gradually from the commencement of the dorsal to the end of the snout, without any elevation at the nape. The head is one-third of the entire length. The lower jaw projects beyond the upper. The maxillary, which is broad, and cut quite square at its extremity, reaches to beneath the middle of the orbit. The suborbital has the margin entire and nearly straight. The upper jaw has a band of velutine teeth, broadish in front, but narrowing (the teeth at the same time becoming smaller and finer) posteriorly; with an outer row of not much longer, but considerably stronger, subconic teeth, placed at rather wide intervals; besides these, there are three or four teeth on each side of the anterior portion of the jaw, equally strong as those last mentioned, but more curved, the points reclining backwards, and set within the velutine band. In the lower jaw, there is the same band as above, but narrower, and with the teeth more in fine card than velutine, with stronger ones anteriorly, and along the posterior half of each side, where there are six or eight, standing nearly in a single row, very stout and curved, though scarcely longer than the others; outside the band, and on each side of the symphysis, there are three or four moderately strong subconic teeth, at short distances from each other, which may be considered as small canines. On the vomer and palatines, the teeth are velutine. The eyes are rather large, and placed high in the cheeks; their diameter is about one-sixth the length of the head: the distance between them equals one diameter and a quarter. The nostrils consist of two orifices, placed one before the other, a little in advance of the eyes, roundish-oval, the posterior one largest. The preopercle has the ascending margin not quite rectilineal, being slightly convex, and the angle at bottom rounded; the denticulations on the former are fine, but very perceptible; they become rather stronger and more distant at the angle, and a few of this character are continued along the posterior half of the basal margin. The opercle is armed with three points; the upper one is triangular, small, and not very obvious; the middle one is a moderately strong spine, about a quarter of an inch in length; the third is a little below this last, and resembles it in form, but is much smaller. The membrane of the opercle terminates in a sharp angle, and is produced considerably beyond the middle spine. The line of separation between the opercle and subopercle is not visible. The gill-opening is large, and has seven rays. There are no scales on the snout or jaws, or between the eyes, or on the anterior portion of the suborbital; but they are present on the cranium behind the eyes, cheeks, (where they are numerous), and pieces of the gill-cover; the limb of the preopercle, and the lower margin of the interopercle, however, are nearly free from them. Those on the opercle are larger than those on the cheeks. All these scales, as well as those on the body, are finely ciliated, communicating a slight roughness to the touch. The supra-scapular is represented by a larger and harder scale than the rest, of a semi-elliptic form, striated on its surface, and obsoletely denticulated on the margin. The lateral line is parallel to the back, at between one-third and one-fourth of the depth. The pectorals are attached below the middle, of a rounded form, the middle rays being longest, and about half the length of the head. The dorsal commences exactly above them, and occupies a space equalling half the entire length, excluding the caudal. The spines are sharp, and moderately strong: the first is rather more than half the length of the second, but scarcely more than one-fifth of the length of the third, which is longest, equalling more than half the depth of the body: from the third they decrease very gradually to the ninth, which is of the same length as the second; the tenth is again a little higher; this is followed by the soft rays, which are nearly even, and about one-third higher than the last spine; the last two or three, however, are a little shorter than the others.

The anal commences in a line with the fifth soft ray of the dorsal, and ends a little before that fin: the second spine is strongest, and twice the length of the first: the soft rays are longer than those of the dorsal. There are a few minute scales between the soft rays of both dorsal and anal, to about one quarter of their height. The caudal is even, but may possibly have been worn so by use. The ventrals are directly under the pectorals, a little shorter than them, and pointed.

COLOUR.—“Varies much. Above pale blackish-green; belly white; fins, gill-covers, and part of the sides, dirty reddish orange: on the side of the back, six or seven good-sized snow-white spots, with not a very regular outline.—In some specimens, the blackish-green above becomes dark, and is separated by a straight line from the paler under parts.—Again, other specimens are coloured dirty ‘reddish-orange,’ and ‘gallstone yellow,’\* the upper parts only rather darker. But in all, the white spots are clear; five or six in one row, and one placed above. Sometimes the fins are banded longitudinally with orange and black-green.”—D.

Habitat, Galapagos Archipelago.

This species, which is undoubtedly new, was obtained by Mr. Darwin at Charles Island, in the Galapagos Archipelago. As many specimens were seen, it is probably not uncommon there. It appears to be a *Serranus*, but its canines, if they can be so called, are very small and inconspicuous. Its naked jaws require it to be placed in Cuvier's first section of that genus, though much larger than most of the species contained in it, and rather differing from them in general form. In some of its characters, it would seem to make a near approach to *Centropriestes*, between which and *Serranus*, there is undoubtedly a very close affinity.

## 2. SERRANUS GOREENSIS. Val.?

*Serranus Goreensis*, Cuv. et Val. Hist. des Poiss. tom. vi. p. 384.

FORM.—The general form approaching very closely that of the *S. Gigas*. Greatest depth one-fourth of the entire length. Head rather less than one-third of the same. The diameter of the eye is one-fifth of the length of the head; and the distance from the eye to the extremity of the snout is about one diameter and a quarter. The lower jaw is covered with small scales, but not the maxillary. The nostrils consist of two round apertures, the anterior one rather larger than the posterior, and covered by a membranous flap. The teeth in the upper jaw form a velutine band, with the outer row in fine card, and two stronger and longer ones near the middle of the jaw on each side: below there is a narrow band of fine card, with stronger ones situated as above. The denticulations at the angle of the preopercle are well developed, especially two teeth which are much stronger than any on the ascending margin. The opercle has three flat spines, the middle one longest and projecting further than the others; but the terminating angle of the membrane projects beyond this spine to a distance equalling the length of

\* In this and in all other cases, Mr. Darwin has used *Werner's Nomenclature of Colours*, by Patrick Syme.



the spine itself. The dorsal has the fourth spine longest, and equalling just half the entire length of the spinous portion of the fin. Both the spinous and soft portions have minute scales between the rays, covering rather more than the basal half of the fin; they rise highest just at the commencement of the soft portion. The caudal is square at the extremity, or with rather more tendency to notched than rounded; the basal half scaly. The anal commences in a line with the third soft ray of the dorsal, and has the basal half of the soft portion finely scaled: the second spine is strongest, but the third somewhat the longest. The pectorals are rounded, with the seventh and eighth rays longest; finely scaled on the upper side for one-fourth of their length from the base, but without any scales beneath. The ventrals are a little shorter than the pectorals, with a spine of about the same length and stoutness as the third anal spine, and rather more than equalling half the length of the soft rays: they are obsoletely scaled on the upper side between the rays.

D. 11/16; A. 3/8; C. 15, &c.—P. 17; V. 1/5.

Length 7 inches.

COLOUR.—(*In spirits.*) Of a nearly uniform bister brown, stained and mottled here and there, particularly on the sides below the lateral line, with patches of a much paler tint.

Habitat, St. Jago, Cape Verde Islands.

The Serran above described, was procured by Mr. Darwin at Porto Praya. I am not sure that I am right in referring it to the *S. Goreensis* of Valenciennes, as in so extensive a genus, and one in which the species are so extremely similar, it is very difficult to identify any one in particular, without the opportunity of comparing it with a large number. But it seems to agree with that species better than with any other I can find noticed by authors; and the island of Goree is sufficiently near the Cape Verde Islands, to render it probable that the same species may occur in both localities. It has the same square tail, which, according to Valenciennes, so particularly characterizes the *S. Goreensis*; but it has one soft ray more in the dorsal. I see no appearance of the deep violet said to border the dorsal and anal fins, but possibly it may have been effaced by the action of the spirit.

### 3. SERRANUS ASPERSUS. *Jen.*

*S. supra viridi-niger, subtus pallidior; lateribus smaragdino pallido aspersis; pinnis anali, caudali, dorsalique posticè, apicibus croceis; dentibus velutinis, caninis in maxillâ superiore utrinque versus apicem duobus sub-fortibus; preoperculo margine prope recto denticulato; denticulis ad angulum paulò majoribus; operculo mu-*

*cronibus tribus planis, intermedio maximo; rostro toto, et maxillâ inferiore, squamatis.*

B. 7; D. 11/15; A. 3/8; C. 17, &c.; P. 17; V. 1/5.

LONG. unc. 4½.

FORM.—Back very little elevated; the greatest depth rather less than one-fourth of the entire length. Nape slightly depressed, with which exception, the dorsal line from the commencement of the dorsal fin to the crown of the head, is nearly horizontal: from between the eyes to the end of the snout, the profile is considerably convex. Head rather more than one-third of the entire length. Eyes large, their diameter about one-fourth the length of the head, high in the cheeks, and distant rather less than a diameter from the end of the snout. Lower jaw longer than the upper. The teeth above consist of a narrow velutine band, with a few, a little behind the anterior extremity, longer than the others, but slender and curving backwards; in front, and on each side of the extremity are two moderate canines: beneath there is a narrow band of velutine and fine card mixed, but no canines. The lower jaw, and the snout quite to the extremity, as well as the suborbitals, are covered with minute scales, but not the maxillary. The preopercle has the ascending margin nearly rectilineal, and finely denticulated; the angle at bottom rather sharp, and the denticles at this part, as well as immediately above it, rather more developed than the others. Opercle with three flat points; the upper and lower ones equal, the middle one larger, but not projecting so far as the membrane. Dorsal spines invested with membranous tags at their tips; of nearly equal lengths, with the exception of the first two; the third and fourth a little the longest: the soft portion of the fin higher than the spinous. Anal rounded, terminating sooner than the dorsal; the second spine a trifle longer than the third, as well as stouter. The caudal is injured, but appears to have been square, or perhaps slightly rounded. Rows of minute scales between the rays of all the vertical fins.

COLOUR.—“Dark greenish, black above, beneath lighter; sides marked with light emerald green: tips of the anal, caudal, and hinder part of the dorsal, saffron yellow; tips of the pectorals orpiment orange.”—D. These colours have been much altered by the action of the spirit. The general ground is now dusky lead, mottled and sprinkled on the sides with dirty white. There is an appearance of four oblong black spots on the upper part of the back beneath the base of the dorsal, not noticed by Mr. Darwin. The tips of the fins have entirely lost their bright colours.

Habitat, Porto Praya, St. Jago, Cape Verde Islands.

This species was also obtained at Porto Praya, off Quail Island. It belongs to that division of the genus which Cuvier has distinguished by the name of *Mérou*, and to his section of *Mérous piquetés*; but it will not accord with any of those described in the “Histoire des Poissons.” There is only one specimen of it in the collection, which is small, and probably not full-sized.



4. SERRANUS LABRIFORMIS. *Jen.*

## PLATE III.

*S.\* fusco-flavo, nigro, alboque variatus; dorsali rubro-marginatâ; spinis fortibus, subæqualibus, ad apices laciniis membranaceis investitis; dentibus aculeiformibus,\* valdè retroflexis, seriebus internis majoribus; caninis, in maxillâ superiore duobus, in inferiore quatuor, mediocribus; preoperculo margine arcuato, vix denticulato; operculo mucrone unico plano, modico, armato; squamis infra lineam lateralem ciliatis, supra et in ventre lævibus.*

B. 7; D. 11/17; A. 3/8; C. 15, &c.; P. 18; V. 1/5.

LONG. UNC. 17.

FORM.—Oblong-oval, with very much the aspect of a *Labrus*. The greatest depth, which is beneath the commencement of the dorsal, is rather less than one-fourth of the entire length. The head is large, and nearly one-third of the same. The profile, from the dorsal to the end of the snout, curves gradually downwards in one continuous bend. The lower jaw projects a little beyond the upper. The teeth form a broadish band of fine card in both jaws, with the inner rows longer and more curved than the outer; in the upper jaw, a little behind the anterior extremity, are three or four longer than the others, and curving so much backwards as almost to be laid flat; at the posterior part of this jaw on each side they pass into velutine. The canines are strong, but not very long; in number two above and four below, not exactly in front, but a little on each side of the middle. The teeth on the vomer and palatines are velutine. The eyes are moderately large, high in the cheeks, equidistant from the upper angle of the preopercle and the end of the snout, with a diameter rather less than one-sixth the length of the head: the distance between them about equals their diameter. The margin of the suborbital is entire, but a little sinuous. The maxillary is large, and cut nearly square at its posterior extremity: it is nearly all exposed, and reaches to beneath the posterior part of the orbit. The nostrils are a little in advance of the eyes, and consist of two round openings, one before the other, the posterior one being the largest. The whole head, including the lower jaw, is covered with small scales, which become more minute towards the extremity of the snout, but are very visible even there: there are none, however, apparent on the maxillary. The preopercle has the basal angle rounded, and the ascending margin a little convex outwards, and denticulated, but the denticles are minute and not very obvious. The opercle and subopercle together (the line of separation between which is scarcely apparent) form a triangle. The former terminates posteriorly in one flat spine, moderately developed, not reaching to the extremity of the membranous angle by twice its own length. The lateral line, which is rather indistinct, is nearly parallel to the back at a little below one-fourth of the depth. The scales on the body below

\* I have employed this term to designate the slender curved teeth, arranged in several rows, which Cuvier calls *en cardes*, or, when less numerous and rather more developed, *en crochets*. They much resemble the prickles found on some plants.

the lateral line are rough, but those above it, as well as those on the belly, nearly smooth: one taken from the middle of the side is of an oblong form, rounded at the free extremity, which is finely dotted and ciliated; its whole surface finely striated, with nine or ten deeper striæ at the base. The pectorals are attached low down, rounded at the extremity, and about half the length of the head. The dorsal commences immediately above them, and is tolerably even throughout its course, extending nearly to the caudal. The membrane is rather deeply notched between the spines, which are very stout and invested at their tips with membraneous tags, as in the *Labridæ*. The first spine is only half the length of the second and third; the fourth is a little the longest, equalling two-fifths of the depth of the body; the fifth and succeeding ones decrease very gradually to the tenth, which is rather more than half the length of the fourth; the eleventh is a little longer, and is followed by the soft rays, the longest of which is about equal to the longest of the spinous. The anal commences about in a line with the second soft ray in the dorsal, and terminates before that fin, leaving double the distance between it and the caudal; first spine not half the length of the second and third, which are about equal, and much stouter; soft portion of the fin of a rounded form, with the middle rays nearly double the length of the second and third spines. Caudal even, or very slightly rounded, without any rows of scales between the rays. Ventrals a little shorter than the pectorals, immediately beneath them, pointed.

COLOUR.—“Mottled with brown-yellow, black and white: upper and lower edges of the caudal, edges of the dorsal and anal, ‘arterial’ and purplish red.”—D.

Habitat, Galapagos Archipelago.

Obtained off Chatham Island in the Galapagos Archipelago. There can be little doubt of its being an undescribed species, well characterized by its *labriform* appearance, as regards the fins, rounded and nearly entire margin of the preopercle, and scales smooth *above*, but rough *beneath* the lateral line.

5. SERRANUS OLFA. *Jen.*

## PLATE IV.

*S. fusco-variatus; spinis dorsalibus ad apices laciniis investitis; naribus orbiculatis, aperturâ unica magnâ, duas minores includenti; dentibus aculeiformibus, retroflexis, seriebus paucis; caninis, in maxillâ superiore duobus, in inferiore quatuor, cæteris vix fortioribus; preoperculo margine adscendenti prope recto, versum angulum paulum sinuato, vix denticulato; operculo mucronibus duobus, parvis, subæqualibus, armato; squamis ubique lævibus.*

B. 7; D. 11/18; A. 3/11; C. 17, &c.; P. 17; V. 1/5.

LONG. UNC. 23½.

FORM.—Rather elongated, with the dorsal and ventral lines equally curved, and neither departing much from a straight line. Depth, in the region of the pectorals, equalling rather more than one-

c



fifth of the entire length. Head contained three and a half times in the same. Profile sloping gradually from the commencement of the dorsal to the end of the snout in one continuous very gentle curve. The lower jaw a little the longest. The teeth are in strong card in both jaws, their points curving inwards and backwards: those above longest anteriorly, where they form about three rows; posteriorly they become velutine, as in the last species, and consist of not more than two rows: in the lower jaw the teeth are equally large at the sides as in front, and, excepting quite at the anterior extremity, in only two rows, the inner of which is stronger than the outer. The canines are small, and scarcely stronger than the other teeth; in number\* and situation, the same as in the *S. labriformis*. The vomerine and palatine teeth are very fine velutine. Eyes rather large, and high in the cheeks, equidistant from the upper angle of the preopercle and the intermaxillary, with a diameter about one-seventh the length of the head: the distance between them equals one diameter and one-third. The margin of the suborbital is entire, and nearly straight. The maxillary, when the mouth is closed, reaches to beneath the middle of the orbit. The nostrils are a little in advance of the eyes, and consist of one large, nearly circular, aperture, enclosing two smaller ones, which are also circular and placed equally in advance. The crown, and space between the eyes, and entire cheeks, are covered with small scales; there are also some minute ones on the lower jaw, and on the extremity of the snout before the eyes; but they are scarcely obvious, if present, on the first suborbital, and not at all perceptible on the maxillary. The preopercle is rather more than rectangular; the basal margin nearly straight and horizontal; the angle rather sharp; the ascending margin with a slight sinuosity just above the angle, afterwards straight and nearly vertical, very obsoletely denticulated throughout its course. The osseous portion of the opercle terminates posteriorly in two flat points, nearly equal, but the lower one rather the more developed, between which it is emarginate. The angle of the membrane is considerably produced beyond the lower point. The line of separation between the opercle and subopercle is tolerably obvious. Gill-opening large. All the pieces of the gill-cover are covered with scales scarcely smaller than those on the body. The scales on the body are not large, of an oblong form, with their free edges scarcely at all ciliated, not enough to feel rough to the touch; their whole surface very finely striated, with twelve deeper striæ on the basal half, and the basal margin crenated. Lateral line not very conspicuous, parallel to the back at about one-fourth of the depth. The dorsal commences in a line with the posterior angle of the opercle, and occupies a space equaling half the entire length, caudal excluded: spines strong, and tagged at their extremities; the second longest, equalling not quite half the depth; third and succeeding ones gradually decreasing to the tenth, which is about half the length of the second; the eleventh again longer; then follow the soft rays, which are nearly even, but all higher than the last spinous. The anal commences in a line with the third soft ray in the dorsal, and terminates a little before that fin: first spine very short; the third longest, but the second stoutest: of the soft rays the third and fourth are longest, and nearly twice the length of the third spine, being longer than the soft rays in the dorsal; from the fourth they gradually decrease, giving this portion of the fin a rounded form. The caudal is nearly even, but the central rays are a little shorter than the outer ones. There are no rows of scales between the soft rays of the dorsal and anal, and

\* There are actually only three below in this specimen, but there is little doubt of four being the normal number, one appearing to have been lost.

scarcely any trace of them between those of the caudal. The pectorals are rounded, attached low down, and about half the length of the head. Ventrals directly beneath them, shorter, and more pointed.

COLOUR.—“Mottled brown.”—D. The dried skin appears nearly of a uniform brown, simply a little paler beneath. There is some indication of a whitish band along the base of the anal and soft dorsal, which may be the remains of a brighter colour. The base of the pectorals and ventrals is also paler than the extremity of those fins.

Habitat, Galapagos Archipelago.

This species was also obtained at Chatham Island, in the Galapagos, where Mr. Darwin states that it is common. In some of its characters it approaches the *S. labriformis*, but in others it is essentially different. It rather departs from most of the *Serrani* in the teeth, and in the small development of the canines. The nostrils also are rather peculiar. Perhaps it may one day be found to constitute the type of a distinct genus.

PLECTROPOMA PATACHONICA. *Jen.*

*P. operculo spinis tribus, intermediâ maximâ; preoperculo margine adscendenti denticulato; ad angulum dente unico, et ad marginem basalem dentibus duobus, fortibus; pinna dorsali spinis quartâ et quintâ longissimis; pectoralibus radiorum apicibus e membranâ paulo exeuntibus; caudali leviter rotundatâ.*

B. 7; D. 13/15 vel 16; A. 3/8 vel 9; C.  $17\frac{2}{3}$ ; P. 17; V. 1/5.

LONG. UNC. 15.

FORM.—Greatest depth about one-third of the entire length, excluding caudal. Head rather exceeding one-third. Profile descending obliquely in nearly a straight line from the commencement of the dorsal to the end of the snout. Eyes large, high in the cheeks; their diameter nearly one-fourth of the length of the head. The lower jaw a little the longest: both it and the maxillary without scales. A band of velutine teeth in each jaw; the outer row in card, with some, stronger than the others, which may be considered canines: above, the principal canines are about six in number on each side near the extremity; below, there are three or four larger than the others similarly situated. The preopercle has the ascending margin distinctly denticulated; on the basal margin are two strong teeth directed forwards, and a third at the angle. The opercle has three strong flattened spines; the middle one most developed. At the lower angle of the subopercle is a small flat moderately sharp point. Fourth and fifth dorsal spines longest; the succeeding ones gradually diminishing to half the height of the soft portion of the fin which follows. Second anal spine very stout. Pectorals with the tips of the rays slightly projecting beyond the membrane, giving it a festooned appearance. Caudal slightly rounded.



COLOUR.—The specimen above described appears, in its present state, greyish brown, with zig-zag lines in different directions of a darker tint. A second individual is stated by Mr. Darwin to have been, when alive, “above salmon-coloured.” A third is described as “above aureous-coppery, with wave-like lines of dark brown, which often collect into four or five transverse bands; fins lead-colour; beneath obscure; pupil dark blue.” Both these last specimens appear now, like the first, greyish-brown. The wave-like lines extend over a portion of the dorsal and anal fins.

Habitat, coast of Northern Patagonia, and the mouth of the Plata.

This species is evidently very closely allied to the *P. Brasilianum* of Cuvier and Valenciennes, and possibly may not be distinct. It differs, however, in having only two, instead of three, teeth on the basal margin of the preopercle, which character prevails in all the specimens. It has also one or two more soft rays in the anal. It likewise approaches the *P. aculeatum* of the same authors, but this last species is said to be particularly characterized by three very sharp points on the subopercle towards the lower angle, in the room of which, in the species here described, there is only one small triangular flattened point, rather sharp in two individuals, but in the third blunt, with the margin slightly crenated. The colours too appear to be different.

Mr. Darwin's collection contains three specimens, which do not materially differ from each other. The largest, measuring fifteen inches in length, was taken in forty fathoms water off the mouth of the Rio Plata. The two others, smaller, and not exceeding nine, and seven and a half inches respectively, were got on the coast of Patagonia in lat.  $38^{\circ} 20'$ : where it is stated that great numbers were obtained, many exceeding a foot in length. In these smaller specimens the canines are not so numerous or well developed as in the larger one.

“One specimen when caught, vomited up small fish and a *Pilumnus*. Was tough for eating, but good.”—D.

#### DIACOPE MARGINATA. Cuv.

*DiaCOPE marginata*, Cuv. et Val. Hist. des Poiss. tom. ii. p. 320.

FORM.—Greatest depth of the body and length of the head equal, each being not quite one-third of the entire length. Nape somewhat elevated, whence the profile falls very regularly in a slightly convex line. The jaws appear equal when open, but when closed the upper one is a little the longest. Teeth velutine, with four well-marked canines in the upper jaw, two on each side of the anterior extremity, the outer one of which is longer than the inner. Opercle with two flat blunt points. Denticulations of the preopercle, particularly those at the angle below the notch, moderately well developed. Tubercle of the interopercle prominent. There are scales on the cheeks and pieces of the gill-cover, but none on the crown, snout, jaws, or suborbitals. The scales on the

body are moderately large. There are rows of small scales between the rays of the vertical fins, but they are more developed between the soft rays than between the spinous. The dorsal has the first spine half the length of the second, which itself is a little shorter than the third; fourth, fifth, and sixth equal and longest; there is very little difference in the lengths of the remaining rays, nor is there much between the spinous and soft portions of the fin, which, taken as a whole, appears nearly even throughout. Anal short, commencing in a line with the fourth soft ray of the dorsal, and terminating at the same distance from the caudal as that fin: second and third spines very stout. Pectorals narrow and pointed, a little shorter than the head. Ventrals a little shorter than the pectorals.

B. 7; D. 10/14, the last double; A. 3/8, the last double; C. 17, and some short ones; P. 16; V. 1/5.

Length 6 inches.

COLOUR.—“Upper part pale lead colour: pectorals yellow; ventrals and anal orange: sides very pale yellow.”—D. In spirits, the colour appears almost uniform greyish-white. The dorsal and anal fins have an edging of black, which is not noticed by Mr. Darwin, and which is characteristic of the species. The caudal is entirely dusky. There are no traces of spots on any part of the body.

Habitat, Keeling Island, Indian Ocean.

All the known species of *DiaCOPE* are stated by Cuvier and Valenciennes, as coming from the Indian seas. The *D. marginata* was first brought from thence by Commerson. It was afterwards received by the authors above mentioned from Pondicherry. The expedition under Captain Duperrey, met with it at the Island of Oualan. Mr. Darwin's specimen was obtained at the Keeling or Cocos Islands: I believe it to be referrible to this species, as it possesses the characteristic black edging on the dorsal and anal fins; but as the description in the “Histoire des Poissons” is very brief, containing a mere notice of the colours, I have thought it advisable to annex that of the present individual.

#### GENUS—ARRIPIS. Jen.

*Membrana branchialis septem-radiata; aperturâ amplâ. Pinna dorsalis unica; spinis gracilibus. Dentes aculeiformes, tennes; serie maxillari externâ cæteris fortiori. Operculum mucronibus duobus parvis posticè armatum. Preoperculum marginibus basali et adscendenti denticulatis; spinis nullis. Ossa infraorbitalia leviter denticulata. Os maxillare squamosum. Squamæ corporis levissimè ciliatis, posticè striis levissimis, transversis, parallelis, flabelli locum occupantibus.*

I propose to establish this new genus for the reception of the *Centropristes Georgiannus* of Valenciennes, which appears to offer sufficient peculiarities to



warrant such a step. Its herring-like form, denticulated suborbital, scaly maxillary, small pectorals, backward position of the ventrals, and deeply forked caudal, sufficiently distinguish it from *Centropristes*, with which it hardly agrees in any of its characters, beyond that of wanting canines, and having the preopercle denticulated, and the opercle armed with small sharp points. Its teeth, however, are not exactly velutine, as in the typical species of that genus, but rather in fine card, with the outer row in both jaws stronger than the others. But, perhaps, one of the most marked peculiarities in this proposed genus resides in the scales, which have, instead of the usual fan of diverging striæ on their basal portions, a triangular space filled up by a number of extremely fine, closely-approximating striæ, parallel to each other, and also parallel to the basal margin, which is cut quite square and entire.\*

Although this genus is thus separated from *Centropristes*, there is no doubt of its having a near affinity with it; and also with *Grystes*, from which last, however, it is at once known by its denticulated preopercle. It is still more closely allied to *Apsilus*, which it very much resembles in its general form, as well as in some of its particular characters. Amongst other points of resemblance with this last genus, may be noticed the similarity of the teeth; the very large gill-opening; the small and inconspicuous points on the opercle; the weak spines of the dorsal and anal, both which fins also terminate in a point behind; the small pectorals, and the deeply forked caudal.

It is probable that the *Centropristes truttaceus* of Cuvier and Valenciennes also belongs to this new genus, which, as well as the *C. Georgianus*, comes from New Holland, and which those authors seem, not without much hesitation, to have placed provisionally in the group in which it now stands. It is not stated, however, whether the peculiar character of the scales in the *C. Georgianus*, above pointed out, exists also in this species.

#### ARRIPIS GEORGIANUS.

*Centropristes Georgianus*, Cuv. et Val. Hist. des Poiss. tom. vii. p. 338.

FORM.—As M. Valenciennes has given an accurate and detailed description of this fish, and as I have already stated above some of its leading characters, it is not necessary to say much further on this head in reference to the specimen in Mr. Darwin's collection. I need only point out wherein it differs from the description in the "Histoire des Poissons," the greater part of which applies exactly. M. Valenciennes states that the ventral profile is more curved than the dorsal, but there is not much difference in their respective degrees of curvature in this

\* The absence of the usual fan has suggested the name of *Arripis*, from *a priv.* et *pis*, flabellum.

specimen. The thickness of the body, which he fixes at one-third of the depth, is here nearly half the depth. The following characters may be also given, in addition to his. Above each orbit are two short crests or ridges which meet at an angle anteriorly, and the interocular space between these pairs of ridges is rather depressed; beyond, or immediately above the upper lip, the snout is a little protuberant. The band of teeth in each jaw is narrow, with the outer row longer than the others; and at the sides of the jaw, this outer row is all that is obvious. The intermaxillary is slightly protractile. The eye is hardly removed so much as one diameter from the end of the snout. The limb of the preopercle is striated; the angle at bottom rounded, and much dilated, so that the ascending margin falls in advance of a vertical. The contour of the membrane of the opercle is rounded. The cheeks, and all the pieces of the gill-cover, with the exception of the broad limb of the preopercle, are scaly: there are also a few scales on the maxillary, but none on the crown between the eyes, or on the snout, or lower jaw. The dorsal and anal terminate nearly in the same vertical line, but the latter reaches a trifle the farthest. Both fins are invested at their base with a scaly membrane, the scales of which are of a long lanceolate form. The length of the caudal equals the depth of the body. That of the pectorals equals half the depth: these fins are attached a little behind the opercle, and a little below the middle. The point of attachment of the ventrals is in a vertical line which passes through the middle of the pectorals, and coincides with the commencement of the dorsal. They are longer than the pectorals; and in their axillæ is a lanceolate membranaceous scale half their own length. There is a similar, but shorter scale in the axilla of the pectorals also.

B. 7; D. 9/16; A. 3/10; C. 17%; P. 15; V. 1/5

Length 9 inches 10 lines.

COLOUR.—Not noticed in the recent state. In spirits, the whole fish appears of a nearly uniform dull metallic yellowish-white, tinged with olive on the back and upper part of the sides.

Mr. Darwin obtained this species in King George's Sound, in New Holland, the same place in which it was discovered by MM. Quoy and Gaimard.

#### APLODACTYLUS PUNCTATUS. Val.

*Aplodactylus punctatus*, Cuv. et Val. Hist. des Poiss. tom. viii. p. 352. pl. 242.

This very remarkable fish was first sent from Valparaiso, by M. D'Orbigny, where it was also observed by M. Gay. Mr. Darwin's collection contains a specimen, which has unfortunately lost the number attached to it; but as he made a collection on that coast, it was probably obtained in the same locality. The description given of it in the "Histoire des Poissons," is so detailed as well as accurate, and the figure so exact, that it is quite unnecessary to annex that of the present individual. I may merely observe that the number of simple rays at the bottom



of the pectorals, which appears to be a character of some importance, and which has led to the generic name of *Aplodactylus*, amounts in this specimen to six, being two more than was observed by M. Valenciennes in his, though the total number of rays in this fin is the same. I may also allude to the circumstance of the dorsal being invested at the base with a thickened membrane on each side, closely covered with small scales, which extends over nearly its whole length, but is most conspicuous along the spinous portion. This character is not mentioned by M. Valenciennes. Neither does he mention the rows of minute scales, which occur between the rays of all the fins, except the ventrals.

Mr. Darwin's specimen of this fish is eleven inches in length. The following is the fin-ray formula :

B. 6; D. 15—1/21; A. 3/8; C. 17. &c.; P. 9—vi; V. 1/5.

#### 1. DULES AURIGA. *Cuv. et Val.*

Dules Auriga, *Cuv. et Val.* Hist. des Poiss. tom. iii. p. 83. pl. 51.

FORM.—This species is remarkable for the prolongation of the third dorsal spine, which, in the present specimen, is not quite equal to half the entire length of the head and body; a small portion, however, appears to have been broken off. The greatest depth is contained three and a half times in the entire length. The head, measured to the extremity of the opercular membrane, exactly equals the depth. The line of the profile is not quite straight, there being a slight depression at the nape, above which is a convexity in immediate advance of the dorsal fin. The lower jaw is a very little the longest. The eyes are large; and the distance between them barely equals their diameter. The other characters are exactly as stated in the "Histoire des Poissons."

B. 6; D. 10/13; A. 3/7; C. 17; P. 17; V. 1/5.

Length 5 inches 3 lines.

COLOUR.—The recent colours are given by Mr. Darwin in his notes as follows: "Sides with numerous waving longitudinal lines of brownish red; the intermediate spaces greenish-silvery, so figured as to look mottled. Head marked with lines of dull red and green. Ventral and anal fins dark greenish blue."—He does not notice the vertical bands alluded to by Cuvier and Valenciennes, which are sufficiently obvious, and which accord with the figure and description of the authors just mentioned.

Habitat, Maldonado Bay, Rio Plata.

#### 2. DULES LEUCISCUS. *Jen.*

Dules malo, *Val.* ? Hist. des Poiss. tom. vii. p. 360.

*D. pinnis caudali, anali, dorsalique molli, nigro-marginatis; dorsali profundè emarginatè, spinè ultimà radiis articulatis breviorè; operculo mucronibus duobus, inferiore maximo, armato; preoperculo margine adscendenti levissimè denticulato, basali denticulis fortioribus.*

B. 6; D. 10/11; A. 3/12; C. 16, &c.; P. 13; V. 1/5.

LONG. unc. 4. lin. 5.

FORM.—General form resembling that of a small *Dace*. Greatest depth about one-third of the entire length, caudal excluded. Length of the head rather less. Dorsal line falling with the profile in one continuous gentle curve. Eyes large; their diameter contained two and a half times in the length of the head: the distance between them less than one diameter. Suborbitals finely but very conspicuously denticulated. Jaws nearly equal; the lower one a little the longest. In each, a band of velutine teeth, with the outer row rather longer than the others. Opercle with two points, the lower one most developed. Preopercle with the limb striated: the ascending margin with the denticulations so fine as to be hardly sensible to the naked eye; those on the basal margin larger and more obvious. Scales of a moderate size; about forty-three in a longitudinal row; their free portions finely striated. Cheeks and opercle scaly; crown naked, with a shallow groove above each eye. Lateral line at first slightly descending, but afterwards straight; its course, until past the dorsal and anal fins, a little above the middle of the depth. Dorsal deeply notched: the anterior portion consisting of nine spines; the first very short, and scarcely more than half the length of the second; third and fourth longer, increasing gradually; fifth and sixth equal and longest, equalling half the depth of the body; seventh, eighth, and ninth, shorter, and gradually decreasing; the tenth spine, with which the second portion of the fin commences, is of the same length as the fifth, but not quite so long as the soft rays which follow; these soft rays, however, gradually become shorter, the last two not more than equalling the second spinous. The whole space occupied by the dorsal is more than one-third of the entire length. Anal commencing in a line with the ninth dorsal spine; its own three spines gradually increasing in length, but the second the strongest; soft portion of this fin longer than the corresponding portion of the dorsal, and terminating a little nearer the caudal. Vent in a line with the seventh dorsal spine. Pectorals small, reaching to the vent. Ventrals attached a little further back, and reaching a very little beyond it. Caudal forked.

COLOUR.—(*In spirits.*) Silvery, tinged on the back, and above the lateral line, with bluish grey, and somewhat mottled in places with darker spots. Fins yellowish-grey, tinged with dusky. The caudal, anal, and soft portion of the dorsal, are a little mottled with dusky, besides having a black edging; there is also a conspicuous black spot at the anterior angle of this last fin.



A second specimen is only three inches and a quarter in length; but differs in no respect from the above, except in having one soft ray less in the anal fin.

Habitat, River Matavai, Tahiti.

Several of the species in this genus are extremely similar as well in form as in colours. Possibly that which I have here characterized as new may not be distinct from the *D. malo* of Valenciennes, which comes from the same country; but the description in the "Histoire des Poissons" is so brief, that it is hardly possible to determine this point with certainty. It has, however, two, and one specimen three, soft rays less in the anal fin. It is also closely allied to the *D. marginatus*, from which it hardly differs, excepting in having the denticulations of the preopercle rather stronger, and the tenth dorsal spine shorter in relation to the soft rays which follow. The *D. marginatus*, however, comes from Java. The species here described was found by Mr. Darwin in Tahiti, in the river of Matavai.

HELOTES OCTOLINEATUS. Jen.

*H. corpore lineis longitudinalibus nigricantibus octo; pinnis dorsali, anali, caudalique, maculis fuscis; vertice stris elevatis duobus subparallelis; preoperculo distinctè denticulato, et ad marginem limbi internum subcristato; operculo mucronibus duobus, superiore minimo; squamis ubique lævissimis.*

B. 6; D. 12/9; A. 3/7; C. 17, &c.; P. 15; V. 1/5.

LONG. UNC. 9. LIN. 9.

FORM.—Body oblong. Greatest depth exactly four and a half times in the entire length. Length of the head rather less than the depth of the body. Snout short and obtuse. Jaws exactly equal: each with a broadish band of velutine teeth, which are all, apparently even the most minute, three-pointed, although this character is not very obvious except in the outer row, which are longer than the others. No vomerine teeth appear externally, but they may be felt through the skin of the palate, and on dissecting this off, there is brought to view a small hard disk rough with minute asperities. Mouth very little cleft, the commissure not extending more than half way between the end of the snout and the anterior margin of the orbit. Eyes rather large; their diameter one-fourth the length of the head. Maxillary, when the mouth is closed, concealed in part beneath the suborbital, the lower margin of which is somewhat sinuous and obscurely denticulated, the denticulations being concealed by the membrane and more easily felt than seen. The denticulations on the preopercle very manifest. The principal spine on the opercle slender and very sharp, not exactly straight, but slightly curved, the convexity of the bend being downwards; above is a second spine, but very small and easily overlooked.

The crown of the head has two nearly parallel elevated lines, which take their origin between the nostrils, and terminate at the occiput, but do not meet as in the *H. sexlineatus*;\* a third line commences there exactly between them, and runs singly in a backward direction down the middle of the nape; this last is scarcely more than half the length of the two former. The cheeks and pieces of the gill-cover are scaly; but not the cranium, snout, jaws, or limb of the preopercle, which last is margined internally by a slightly elevated ridge. The scales on the body are thin and small, and without any trace of denticulations on their free edges, even under a magnifier, and the body of the fish is quite smooth to the touch rubbed either way. Lateral line as in *H. sexlineatus*. Dorsal also nearly similar, but more deeply notched, the membrane beyond the eleventh spine falling nearly to the base of the twelfth, which precedes the soft portion: sixth spine longest, equalling very nearly, but not quite, half the depth; the eleventh equals the second; the twelfth is about one-third longer than the eleventh, but is itself scarcely half the first soft ray. The anal has three soft rays less than the *H. sexlineatus*, and there are apparently but two spines, the first being (at least in this specimen, where, however, there may have been a portion broken off) quite short and rudimentary; the second and third spines are both slender, the former being rather more than half the length of the latter, and this last rather more than half the first soft ray. All the fins take their origin as in *H. sexlineatus*. The pectorals are about two-thirds the length of the head. The ventrals, which are very near together, are longer than the pectorals, but do not equal the head: they have no elongated scale between them, or in their axillæ.

COLOUR.—For the most part similar to that of the *H. sexlineatus*; but the longitudinal dark lines are more numerous, amounting to eight, with faint traces of a ninth: the additional ones are on the upper half of the sides, or above the lateral line, there being four (instead of two) above that one which passes through the eyes; the sixth extends the whole length of the fish from the end of the maxillary to the base of the caudal; the seventh passes immediately below the pectoral, and terminates in advance of it, without quite reaching to the edge of the gill-cover; the eighth is exactly equi-distant from the pectoral and ventral; this last is a very narrow pale line, but the others, with the exception of the first two, are broader and well marked. The soft portion of the dorsal, as well as the anal and caudal are spotted; the spots on this last unite to form transverse fasciæ; those on the anal are not very well-defined. The pectorals and ventrals are without spots, and pale.

Habitat, S. W. coast of Australia.

This species was procured in King George's Sound, New Holland. It closely approaches the *H. sexlineatus* of Cuvier and Valenciennes, the only species of the genus hitherto described, and obtained in the same seas by MM. Quoy and Gaimard. I have little hesitation, however, in pronouncing it to be distinct. Independently of the additional longitudinal lines on the body, and the spots on the fins, which, it is expressly stated by the above authors, are not present in the *H. sexlineatus*, it is distinguished by the striæ on the crown not meeting behind, the dorsal being rather more deeply notched, and the fin-ray formula different.

\* Or at least as represented in the figure in the Histoire des Poissons, tom. iii. pl. 56.



There is one soft ray less in the dorsal, and three less in the anal; also the first spine in this last fin, if it be not broken off in this specimen, is quite rudimentary. The scales present no trace of cilia on their free edges.

1. *PINGUIPES FASCIATUS*. Jen.

PLATE V.

*P. corpore fasciis transversis duodecim castaneo-fuscis, alternis latioribus; dentibus palatinis paucis, conicis, subaggregatis, vix seriem formantibus; pharyngalibus aculeiformibus; membrana branchiali mediocriter emarginatâ; operculo spinâ unicâ forti, alterâ superiore obsoletâ; pinnis ventralibus accuratè thoracicis.*

B. 6; D. 7/27; A. 1/24; C. 15, &c.; P. 18; V. 1/5.

LONG. unc. 12. lin. 9.

FORM.—Body thickest, as well as deepest, in the region of the pectorals, compressed behind, and becoming more so as it approaches the tail; depth also gradually diminishing from that point. The greatest depth is rather less than five and a half times in the entire length: head contained four times and a quarter in the same. The thickness at the pectorals is at least three-fourths of the depth: and the thickness of the head is quite equal to it. Dorsal line nearly straight from behind the eyes, in front of which the profile descends obliquely. Eyes high, nearly reaching to the line of the profile; a little behind the middle point of the length of the head; their diameter rather less than one-fifth of this last; the distance between them one diameter and a half. The commissure of the lips does not reach to the eyes by a space equalling half the diameter of the eye. Jaws equal. Lips very thick and fleshy, and partially reflexed, like those of a *Labrus*. Teeth very similar to those of that genus. In the upper jaw, an outer row (extending all round) of strong, sharp, slightly curved teeth, regularly set, and nearly even, but with the anterior ones a little the longest; in all about forty, twenty on each side; behind these a velutine band, broadest in front, but also extending the whole way round. In the lower jaw, a row of curved strong teeth, similar to those above, but extending only half way along the sides of the jaws (about nine on each side), and followed by about seven or eight short blunt conical ones; a broad velutine band behind the longer curved teeth, but not behind the others. On the front of the vomer are four or five large blunt conical teeth, mixed with smaller ones of the same form: there is also a small group of these little conical teeth at the commencement of each palatine, but they are not carried on further in a single row.\* Tongue small and inconspicuous, fastened down except just at the tip, smooth. Pharyngeal teeth in strong card; but no conical ones behind that are visible. Branchial membrane united to its fellow, and free all round at the margin, with a moderately deep notch underneath. Preopercle rounded at the angle; the ascending margin oblique. Opercle with a strong sharp spine at its upper angle, but not ex-

\* As described by Cuvier and Valenciennes to be the case in the *P. Brasilianus*.

tending beyond the membrane; a second rudimentary one above it obtusely rounded. Small scales on the cheeks, preopercle, and opercle, but not on the snout, or between the eyes, or on the suborbital, or jaws, or branchial membrane, or interopercle. The scales on the body are rather small, finely ciliated on their edges, thin, and of an oblong form, cut square at the basal margin, with a fan of twelve or fifteen striae. Lateral line not very strongly marked, taking nearly a straight course from the upper part of the scapular to the caudal. No particular lines, markings, or pores, about the head, jaws, or between the eyes. Pectorals rounded; two-thirds the length of the head. Ventrals exactly beneath them, a very little shorter, thick and fleshy, so that the rays can hardly be distinguished. Dorsal and anal similar to those of the *P. Brasilianus*; the former has the spinous rays at first low, but the rest of the fin is of one uniform height, equalling a little less than half the depth: the latter commences under the sixth soft ray of the dorsal, and terminates in the same line. Caudal square, with rows of small scales between the rays for half their length: also a few minute scales at the base of the pectoral rays, but none on the other fins.

COLOUR.—“Above pale ‘chestnut brown,’ so arranged as to form transverse bands on the sides; sides, head, fins, with a black tinge; beneath irregularly white: under lip pink: eyes with pupil black, and iris yellow.”—D. *In spirits*; the back and upper half of the sides are brown, the lower half of the sides and belly pale, with twelve transverse dark fasciae, the alternate ones broader than the others. The dorsal and anal appear to have been bluish, the tint increasing in intensity from the base upwards; but the former is edged above with a narrow white line just beneath the tips of the rays, which extends the whole length of the soft portion of the fin. The inside of the ventrals appears also to have been bluish; but the pectorals are pale, or yellowish. Caudal brown like the back.

Habitat, coast of Northern Patagonia.

From the east coast of Patagonia, in Lat. 37° 26'. There can be no doubt of its belonging to the genus *Pinguipes*, with which it agrees in its very strong resemblance to the *Labridæ*, as regards the head, lips, and teeth, and in its fleshy ventrals; but there are very few teeth on the palatines, seeming to show that there is not much ground for separating this genus from *Percis*. In many of its characters, it resembles the *P. Brasilianus* of Cuvier, but it is decidedly distinct in others. It differs slightly in its proportions; in the palatine and pharyngeal teeth; in the position of the ventrals, which are not at all jugular, but immediately beneath the pectorals; in the branchial membrane being more notched; and in having two soft rays less in the anal. The colours also are different.

This fish is so like a *Labrus*, that at first sight it might easily deceive a student. Nevertheless its vomerine teeth, spines on the opercle, and ciliated scales, point out its right family. At the same time no system can be considered natural, which does not admit *Pinguipes* as one of the connecting links between the *Percidæ* and *Labridæ*.



2. PINGUIPES CHILENSIS. *Val.*

*Pinguipes Chilensis*, *Cuv. et Val.* Hist. des Poiss. tom. ix. p. 338.

FORM.—More slender and elongated than the last species. Depth nearly six and a half times in the entire length. Head four times and a quarter in the same. Eyes high, a little before the middle, or with the distance in front to the end of the snout not equalling that behind measured to the posterior part of the opercle; their diameter nearly six times in the length of the head; the interval between them nearly two diameters. When the mouth is closed, a vertical from the posterior part of the maxillary forms a tangent to the anterior part of the orbit. Lips not so thick and fleshy as in the *P. fasciatus*; but the teeth almost exactly similar. Tongue much larger, occupying nearly the entire platform of the mouth. Branchial membrane much more deeply notched, the notch reaching as far as the anterior extremity of the interopercle. Preopercle with the ascending margin nearly vertical. Opercle with two small flat spines, the lower one rather more developed than the upper. Scales and lateral line as in the *P. fasciatus*. Pectorals similar. Ventrals attached entirely in front of the pectorals, though not much in advance; fleshy, but perhaps rather less so than in the *P. fasciatus*: in neither species do they pass beyond the pectorals, or indeed reach quite so far. The other fins exactly similar. The dorsal, however, has one spine less, and one soft ray more. The anal, also, has one soft ray more.

B. 6; D. 6/28; A. 1/25; C. 17, &c.; P. 19; V. 1/5.

Length 11 inches.

COLOUR.—(*In spirits.*) Back and sides deep brown, with the exception of two rows of pale spots along the sides, very faint and ill-defined. Underneath altogether paler. The dorsal and anal appear to have been bluish, with the basal portion of each fin pale, but without any edging of white above. Inside of the ventrals blue; pectorals the same, but paler. The caudal shows some trace of a dark round spot on the base of the upper lobe. Mr. Darwin's notes, with respect to the colour in the living fish, only state "fins dark."

Habitat, Valparaiso, Chile.

This species, which was procured by Mr. Darwin at Valparaiso, is probably the same as the *P. Chilensis* of Valenciennes, obtained by M. Gay on the same coast. But the description in the "Histoire des Poissons" is brief, and notices very little besides the colours, which accord tolerably well. Mention, however, is made of a second spine in the anal fin, which certainly does not exist in the above specimen, though a very careful examination was made in search of it. There is also one soft ray more in this fin, as well as in the dorsal, in the fin-ray formula in that work.

This species is very distinct from the *P. fasciatus* last described, and does

not show so strong a resemblance to the *Labridæ*; but it approaches very closely the *P. Brasilianus*.

PERCOPHIS BRASILIANUS. *Cuv.*

*Percophis Brasilianus*, *Cuv. et Val.* Hist. des Poiss. tom. iii. p. 209. pl. 64.

— *Brasiliensis*, *Freycinet*, (*Voyage*) Zoologie, p. 351, pl. 53. fig. 1.

FORM.—Depth and breadth in the region of the pectorals about equal, each being contained ten and a half, or nearly eleven times in the entire length. Head not quite four and a half times in the same. In the upper jaw, three strong, curved, sharp-pointed canine teeth on each side; besides a velutine band extending the whole way, with the outer row longer and more developed than the others: in the lower jaw a velutine band, with long sharp canines, similar to those above, arising amongst them at nearly regular intervals, to the number of ten or eleven on each side; none exactly in front, and not all of the same size, but passing here and there into card. Membranous margin of the preopercle very finely, almost obsoletely denticulated. Branchial membrane with seven rays, the seventh being not much smaller than the sixth.\* The whole head covered with scales, including the lower jaw, and the upper half of the maxillary. Lateral line nearly straight, a little above the middle. First dorsal commencing at about one-third of the entire length, excluding caudal; of a triangular form, with its length a little exceeding its height; second spine longest, about equalling the depth of the body. Distance between the two dorsals equalling half the length of the first. Second dorsal with the first ray longest, equalling the longest of the spines in the first dorsal; second and succeeding rays slightly decreasing to the sixth, beyond which they are nearly even, with the exception of the last three or four, which are shorter; all these rays very much branched, with the intervening membrane deeply notched. Anal commencing a little before the end of the first dorsal, and terminating nearly in a line with, but in strictness a very little beyond, the second dorsal; rays and membrane much as in that fin, to which it answers in general height. Distance between the second dorsal and caudal, only one-twenty-eighth of the entire length. Caudal appears obliquely square, the upper rays being slightly longer than the lower, but perhaps worn so. Pectorals one-eighth of the entire length. Ventrals about three-fourths of their length, attached in front of them, as described by Cuvier. In the axillæ of the pectorals is a falcated membranaceous appendage covered with scales (not noticed by Cuvier), a very little less than one-fourth the length of the fins themselves.

B. 7; D. 10—32; A. 41; C. 15. &c.; P. 18; V. 1/5.

Length 21 inches.

COLOUR.—"Above pale, regularly and symmetrically marked with brownish red, the tip of each scale being so coloured. Beneath silvery white. Sides with a faint coppery tinge. Ventral fins yellowish. Pupil of the eye intense black."—D.

\* Cuvier in his description, says, of the seventh ray, "fort petit," but it is very obvious in this specimen, and scarcely smaller than the sixth, as above stated.



*Second Specimen*.—Breadth or thickness at the pectorals about ten and a half times in the entire length. Depth at that point less than the breadth. Canine teeth in the lower jaw smaller than those above, and not set at such regular intervals as in the first specimen.\* Scarcely any appearance of denticulations on the membranous border of the preopercle. Distance between the two dorsals a little less than the length of the first. Pectorals contained eight and a half times in the entire length. Fin-ray formula as follows:—

D. 9—32; A. 42; C. 15, &c.; P. 17; V. 1/5.

Length 14 inches.

In all other respects exactly similar to the specimen first described.

Habitat, coast of Northern Patagonia, and Maldonado.

Mr. Darwin's collection contains two specimens of this fish, which was first discovered by MM. Quoy and Gaimard at Rio Janeiro. The larger one was caught by hook and line in fourteen fathoms water on the coast of Patagonia, in lat.  $38^{\circ} 20'$ . The second was taken at Maldonado, where he states it to be common. They differ in several respects from the description and figure in the "Histoire des Poissons," of Cuvier and Valenciennes; but as they also differ a little from each other, the species is perhaps subject to variation. Amongst other points, I may mention the scales on the jaws, which are expressly stated by Cuvier to be *without* scales; and also the emargination of the membrane between the rays of the second dorsal and anal, which is not represented in his figure, nor alluded to in his description, though very striking. This last character appears, however, in the figure given in the Zoological Atlas of Freycinet's voyage, which is on the whole a more correct representation. "When cooked, was good eating."—D.

#### FAMILY.—MULLIDÆ.

##### 1. UPENEUS FLAVOLINEATUS. *Cuv. et Val.*

*Upeneus flavolineatus*, *Cuv. et Val.* Hist. des Poiss. tom. iii. p. 336.

FORM.—Considerably elongated. Greatest depth contained five times in the entire length, caudal excluded. Head three and a half times in the same. Dorsal line nearly straight. Profile very convex. Crown between the eyes broad and somewhat depressed, forming a slight hollow.

\* Probably these teeth are liable to be lost or broken off, so as seldom to occur in exactly the same number and mode of arrangement in two individuals.

Eyes large; their diameter more than one-fourth that of the head. Suborbitals marked on their surface near the lower margin with six or eight diverging salient lines, each terminating at bottom in a mucous pore. Teeth forming a narrow velutine band, hardly visible to the naked eye, but sensible to the touch: none on the vomer or palatines. Opercle with one short flat spine projecting beyond the posterior margin rather more than half a line. Barbules reaching to a little beyond the angle of the preopercle. Mucous tubes of the lateral line with five or six branches; the branches not always simple,\* but consisting sometimes of two or three main ones which are subdivided. First dorsal of a triangular form, with the spines rather slender; the first two equalling more than three-fourths of the depth of the body. Space between the dorsals about equalling the length of the first. Second dorsal with the first ray (or spine) scarcely more than half the length of the second, which is longest; the third and succeeding rays gradually decreasing to the last, which is shortest. Length of the second dorsal just equalling its greatest height. Anal answering to this last fin. Caudal deeply forked; the central rays not being one-fourth the length of the outermost ones. Ventrals and pectorals exactly of the same length; both reaching to a vertical line from the extremity of the first dorsal. Vent in a line with the commencement of the second dorsal.

D. 7—1/3; A. 1/6; C. 15, &c.; P. 16; V. 1/5.

Length 6 inches 9 lines.

COLOUR.—"Dull silvery, with a yellow stripe on the side."—D.

There can be but little doubt of this species being the *U. flavolineatus*, which appears to have a wide range over the Indian Ocean, and also to occur in the South Pacific. Mr. Darwin's specimen was taken at the Keeling Islands.

##### 2. UPENEUS TRIFASCIATUS. *Cuv. et Val.*

*Upeneus trifasciatus*, *Cuv. et Val.* Hist. des Poiss. tom. iii. p. 344.

FORM.—General form resembling that of the *Mullus Surmuletus*, but the snout more elongated. Greatest depth contained about four times and a half in the entire length. Head exactly one-fourth of the same. Eyes small, distant three diameters from the end of the snout. Suborbitals with a moderate number of pores on their disk, but without any salient lines. Posterior extremity of the maxillary broad. A single row of conical teeth in each jaw, very uniform in size, not very large or very close; about twenty-two above and twenty below. Spine of the opercle about a line in length. Barbules reaching to, or a little beyond, the posterior margin of the opercle. Lateral line not much ramified. Height of the first dorsal equalling more than half the depth. Space between the two dorsals equalling one-third the length of the second dorsal.

\* As stated by Cuvier and Valenciennes.

E



Both this last fin and the anal terminating in a considerable point behind. Ventrals large, reaching very nearly to the anal.

D. 8—9; A. 7; C. 15, &c.; P. 16; V. 1/5.

Length 7 inches 9 lines.

COLOUR.—(*In spirits.*) Dark brownish yellow, with faint indications of three dusky patches or abbreviated transverse fasciæ, one beneath each dorsal, and the third on each side of the upper part of the tail. Second dorsal and anal crossed by several whitish longitudinal lines; the posterior point of each fin nearly black.

This species was obtained by Mr. Darwin at Tahiti. It is probably the *U. trifasciatus* of Cuvier and Valenciennes, who received their specimens from the Carolinas and Sandwich Islands. But it does not so well accord with the *Mulle multibande* of Quoy and Gaimard, which is supposed by the authors of the "Histoire des Poissons," to be the same as their species. If the figure in the Zoology of "Freycinet's Voyage" be correct, the *Mulle multibande* has the nostrils much smaller, and the spines of the first dorsal much stronger; the ventrals also are relatively much shorter, so as to reach very little more than half way to the anal. Future observation must determine whether the two fish are distinct or not.

### 3. UPENEUS PRAYENSIS. *Cuv. et Val.?*

*Upeneus Prayensis*, *Cuv. et Val.* Hist. des Poiss. tom. iii. p. 357.

FORM.—Very much resembling that of the *U. trifasciatus*, but with the following differences. The eyes rather larger, distant from the end of the snout rather more than two diameters and a half. Suborbitals traversed towards their lower margins by a number of lines, each terminating in a pore, and with their whole disks studded besides with pores without lines: the lower margin itself presents four distinct deeply-cut notches, the first of which receives the end of the maxillary when the mouth is closed. A single row of small conical teeth in each jaw; in addition to which, in the upper, there are some stronger ones in front, exterior to the others, amounting to eight in number, the central pair of which bends inwards or towards each other, and the three on each side, which are the strongest of all, backwards and outwards. No teeth on the vomer or palatines. The posterior extremity of the maxillary is much narrower than in the last species. Spine of the opercle sharp and well developed, about two lines and a quarter in length. Barbules reaching very nearly to the posterior margin of the opercle. Ramifications of the mucous tubes on the lateral line very numerous. Height of the first dorsal equalling rather more than half the depth. Space between the two dorsals equalling half the length of the second dorsal. This last fin pointed behind, as well as the anal, but not so much so as in the *U. trifasciatus*. Pectorals when laid back reaching to a vertical line from the extremity of

the first dorsal. Ventrals reaching a little beyond the pectorals, but falling short of the anal by a space equalling half their own length.

D. 8—9; A. 7; C. 15, &c.; P. 16; V. 1/5.

Length 8 inches.

COLOUR.—"Vermilion, with streaks of iridescent blue."—D. In spirits, the colour appears of a uniform dull reddish yellow, without any indication of spots or other markings on the fins or body.

Habitat, Porto Praya, Cape Verde Islands.

I suppose this to be the *U. Prayensis* of Cuvier and Valenciennes, the description of which, so far as given in the "Histoire des Poissons," is tolerably applicable. Those authors, however, mention a spot in the middle of each scale of a deeper red than the ground colour, which is not alluded to by Mr. Darwin in his notes, and of which I see no trace on the fish in its present state. On the other hand they are silent with regard to the blue streaks. In some of its characters, especially as regards the teeth, this species seems to approach the *U. maculatus*; but the colours are different in this last also, which is moreover found on the opposite side of the Atlantic.

### FAMILY.—TRIGLIDÆ.

#### TRIGLA KUMU. *Less. et Garn.*

*Trigla kumu*, *Less. et Garn.* Zoologie de la Coquille, (Poissons) Pl. 19.

— *Cuv. et Val.* Hist. des Poiss. tom. iv. p. 36.

FORM.—In general appearance very much resembling the *T. Hirundo*, but more elongated. Depth contained about five times and a half in the entire length. Head rather more than four times and a quarter in the same. The obliquity of the profile about the same as that of the *T. Hirundo*, but the concavity of the interocular space less. The granulations on the head not so coarse, or so strongly marked, the lines in which they are arranged being closer and more numerous: those on the suborbitals radiate from a point nearer the extremity of the snout: no crest or ridge at the bottom of the suborbital, and only a very indistinct one at the bottom of the preopercle: as Cuvier has well noted, the grains on the border of the preopercle are divided into little isles, or collected in clusters, by irregular lines which undulate amongst them; and in this specimen, the same character presents itself on the posterior and upper portion of the suborbital: some of the first lines on the opercle are plain, or without granulations. Snout emarginated, with three or four denticulations on each side rather sharper and more developed



than in the *T. Hirundo*. Two spines at the anterior angle of the eye; but none at the posterior angle, or on the temples. Suprascapular, opercular, and clavicular spines much as in the *T. Hirundo*. Lateral line and whole body smooth, excepting the dorsal ridges, which are strongly serrated. Dorsal spines as in the *T. Hirundo*; second longest; the first with a series of obsolete granulations on its anterior edge. Pectorals not quite one-third of the entire length: free rays incrassated in the middle, tapering towards the ends, but with the extreme tips slightly dilated.

D. 10—16; A. 16; C. 11, &c.; P. 11, and 3 free; V. 1/5.

Length 16 inches 6 lines.

COLOUR.—“Whole body bright red.”—D. The pectorals, of which no note was taken in the recent state, appear, in the dried skin, externally, of a dusky colour, approaching to black, with white rays; the lower margin, however, is paler, and was probably originally red like the body: inside, the colour is much the same, but variegated with a few white spots; there are also portions of a paler tint, probably the remains of a fine blue. I see no distinct trace of the large deep black spot, said by Cuvier to occupy the seventh and eighth rays on the posterior face of the fin.

Taken in the Bay of Islands, New Zealand. The only respect in which it differs from the description of the *T. kumu* by Cuvier and Valenciennes, is its having one more spine in the first dorsal.

#### 1. PRIONOTUS PUNCTATUS. Cuv. et Val.

*Prionotus punctatus*, Cuv. et Val. Hist. des Poiss. tom. iv. p. 68.

FORM.—Well characterized by the form of the snout, which is very obtuse, and as it were truncated, with scarcely any notch in the middle; the margins of the lobes are crenated with minute denticles, immediately beyond which is a small sharp spine directed backwards; further on, almost immediately above the corners of the mouth, is a second similar, but somewhat larger spine. There are also some minute spines on the temples, as well as on the ridge of the preopercle, besides the ordinary spines, common to other species, which in this are all well developed and very sharp. Dorsal spines smooth, or only the first with a faintly marked line of granulations; third longest. Pectorals long, contained exactly two and a half times in the entire length; when laid back, they reach to within two rays of the extremity of the second dorsal. Free rays rather slender and tapering, with the extreme tips pointed; not above half the length of the pectorals. Ventrals rather longer than the free rays.

D. 10—12; A. 11; C. 11, &c.; P. 13 and 3; V. 1/5.

Length 8 inches 9 lines.

COLOUR.—“Above and sides olive brown, with red spots and marks; beneath silvery white; edges of the pectoral fins Prussian blue.”—D.

This species is said by Cuvier and Valenciennes to be common all along the Brazilian coast as far as the mouth of the Plata. Mr. Darwin's specimen was taken swimming on the surface in the Bay of Rio de Janeiro, and agrees well with the description by those authors. “When first taken made a croaking noise.”—D.

#### 2. PRIONOTUS MILES. Jen.

PLATE VI.

*P. splendide rubro variatus; rostro emarginato, utrinque distinctè denticulato; buccis levissimè granulosis; fossulâ dorsali lateribus inermibus; squamis corporis parvis, ubique ciliatis; pinnis pectoralibus modicis, corpore certè triplò brevioribus; radiis liberis subincrassatis, apicibus dilatatis.*

B. 7; D. 10—12; A. 11; C. 12, &c.; P. 13 et 3; V. 1/5.

Long. unc. 10. lin. 3.

FORM.—In general form, that of the head especially, very similar to the *Trigla Hirundo* of the British seas. Compared with the *P. punctatus* last described, it is rather more elongated, the depth and thickness being less. Profile falling less obliquely. Space between the eyes broader, but equally concave. Snout not so obtuse, and more deeply notched; with six short but well developed teeth on each side, followed by some minuter denticles. The lines of granulations on the snout and cheeks are very fine, and not so strongly marked, or spread over so large a portion of the face. One principal spine, preceded by two or three small denticles, at the anterior angle of each orbit; at the posterior angle, a well marked notch with a small denticle, (in this specimen the denticle on the left side of the head only,) but no regular spine: these notches are connected by a transverse line on the cranium, but not by a groove (as in *P. Carolinus*, Cuv. et Val.). No spines on the temples, or on the crest at the bottom of the preopercle; but the ordinary spine of the preopercle, as well as the opercular, suprascapular, and clavicular spines, appear as usual, though not quite so long as in the *P. punctatus*; the clavicular spine has one line of points along its ridge, but the granulations are not very obvious. Band of palatine teeth much as in *P. punctatus*. First dorsal spine with a row of granulated points in front; the second spine with a row on the left side of the fin; the third spine with a very rudimentary row on the right side; but none of these granulations very obvious: third spine longest, equalling about three-fourths of the depth of the body; the fourth and succeeding spines gradually decreasing to the tenth, which is barely visible, and so reclined as to be easily overlooked. Dorsal groove shallow, with the sides unarmed. Scales on the body small, broader than long; their free edges finely ciliated, communicating a decided roughness to the touch; their concealed portions crenated at the hinder margin, and marked with a fan of five or six striæ. Lateral line not distinguished by any particular scales, but forming a whitish streak from the upper part of the gill-opening to the caudal. Pectorals relatively shorter than in *P. punctatus*, contained a little more than three times in the entire length; when laid back they reach to a vertical line from the fourth



ray of the second dorsal. Free rays rather stout, with their tips somewhat dilated and approaching to spatuliform; in length about two-thirds that of the pectorals. Ventrals a trifle longer than the first or longest of the free rays.

COLOUR.—“Above mottled brilliant tile red; beneath silvery white.”—D. Mr. Darwin is rather doubtful whether by the above description, he meant that the entire fish was brilliant red, or only mottled with red upon some obscure ground.

Habitat, Galapagos Archipelago.

Taken at Chatham Island, in the Galapagos Archipelago, and decidedly distinct from all the species described by Cuvier and Valenciennes. From *P. strigatus* it differs in the finer granulations of the cheeks, less obtuse and more deeply notched snout, smooth scales, and absence of a second lateral line; from *P. Carolinus* in the want of a transverse groove on the cranium, and in the fin-ray formula, but it resembles this species in the dilated tips of the free rays; from *P. punctatus* as pointed out in the description; from *P. tribulus* in the want of the spine on the suborbital, and in its much shorter pectorals. These fins indeed are shorter than in any of the above-mentioned.

As all the species described in the “Histoire des Poissons,” are found on the Atlantic side of America, the geographical range of this genus is extended to the Pacific by the discovery of the present one.

#### FAMILY—COTTIDÆ.

##### ASPIDOPHORUS CHILOENSIS. Jen.

PLATE VII. FIG. 1. Lateral view twice nat. size.

Fig. 1a. Dorsal view nat. size.

Fig. 1b. Lateral view nat. size.

*A. corpore elongato, anticè octagono, posticè hexagono; vomere et ossibus palatinis dentibus distinctis instructis; maxillis subæqualibus; rostro ultra fauces haud producto; mento et membraná branchiali cirratis: pinnis dorsalibus discretis; primâ radiis gracilibus.*

B. 6; D. 8—7; A. 8; C.  $11\frac{2}{3}$ ; P. 14; V.  $1\frac{1}{2}$ .

Long. unc. 2. lin. 7.

FORM.—More elongated than the *A. cataphractus*, which it somewhat resembles in general appearance. Anterior portion of the body octagonal, and the posterior, or all beyond the second dorsal and anal, hexagonal. Head equally depressed as in that species; but its breadth less, being only one-fifth of the entire length, caudal excluded. Length of the head rather less than

one-fourth of the entire length. Depth at the nape rather less than one-seventh of the same. Eyes relatively a little larger than in *A. cataphractus*; their diameter one-fourth the length of the head; placed high in the cheeks, and distant one diameter from the end of the snout. Upper part of the orbit elevated into an osseous ridge on each side of the crown of the head, with a spine at its anterior angle, and the ridge itself terminating in a sharp, rather stronger, spine at the posterior angle; both spines directed backwards. Space between the eyes concave, equaling in breadth not quite one diameter of the eye, with two longitudinal sharp ridges running respectively parallel to the ridges of the orbits, but not nearly so much elevated as these last; these ridges terminate posteriorly at a groove, which runs transversely behind the eyes, separating the vertex from the occiput. The snout presents the same four spines, which are to be seen in the *A. cataphractus*, but it does not project beyond the mouth. The lower margin of the suborbital presents a somewhat irregular ridge formed by a series of bluntish tubercles, the last of which terminates in a very minute spine directed backwards. Limb of the preopercle with three diverging smooth ridges, dilating at their extremities into three flattened blunt points, which project a little beyond the membrane, but can scarcely be called spines. Opercle with one ridge not so strongly marked as those of the preopercle, and not terminating in any distinct point, nor even reaching quite to the edge of the membrane. Jaws nearly equal; but the upper one a very little the longest; each with a narrow band of minute velutine teeth: a distinct chevron of similar teeth on the front of the vomer, and a short imperfect row on each palatine. Tongue smooth. Gill opening large: the branchial membrane not notched, but passing transversely over the isthmus, to the edge of which it is nevertheless attached on each side. Chin clothed with short fleshy cirri; also a few on the lower jaw and branchial membrane; but they are much shorter, and less conspicuous than in the *A. cataphractus*, especially on the branchial membrane, where they are very sparingly scattered. The occiput presents the four usual ridges formed of granulated tubercles; and between the innermost pair there is also a much less conspicuous, but slightly raised line running longitudinally down the middle: the two innermost of the above ridges are nearly in a line respectively with the two ridges of the orbit, behind which they commence, and they would pass on to unite with the two dorsal carinæ were they not separated from the latter by a deep transverse depression at the nape: the two outermost of the occipital ridges commence behind the eyes themselves, and terminate at the suprascapulars, each in a sharp point directed backwards, but not prolonged into a spine. The carinated scales which arm the body of this species, are more sharply serrated than those of the *A. cataphractus*, the keels terminating behind in hooked points; and the elevated lines which form the striæ on each side of the keel are fewer in number and more raised. The ridges which they form are also more marked, and the second ridge on each side commences immediately behind the angle of the opercle, instead of opposite the vent as in that species; so that the whole body is perfectly octagonal from the gills to the termination of the dorsal and anal fins: \* at that point, the two dorsal ridges and the two ventral unite respectively to form one, or rather approximate so closely as to form but one in appearance; for, if closely examined, there will still be found two parallel rows of serratures. In each of the two uppermost or dorsal ridges, there are twenty-seven scales, reckoning from the hollow at the nape to the point where the ridges unite. In the second ridge (which extends, as before observed, from the gills to the caudal) there are thirty-

\* In the *A. cataphractus*, the body is hexagonal from the gills to a little beyond the vent; octagonal from this last point to the termination of the dorsal and anal fins; then hexagonal again to the end of the tail.



eight. In the third, which commences behind the pectoral, and extends in like manner to the caudal, there are thirty-five. In the fourth, which commences on the breast, immediately behind the point of attachment of the branchial membrane to the isthmus, there are thirty, reckoning to behind the anal, where it unites with its fellow to form one; between this point and the caudal there are ten, the serratures of which are rather obsolete. The fourth pair of ridges are throughout their course less sharply serrated than the second and third pairs, and these last again rather less so than the first or dorsal pair. Between the two ventral ridges, near their commencement in front of the ventral fins, are six slightly serrated scales (similar to those in the ridges) forming on the breast a somewhat triangular patch, two single ones standing first, then four others in pairs. The lateral line, which is catenulated as in *A. cataphractus*, commences at the upper angle of the opercle, then bends downwards to take a middle course between the second and third ridges, which it preserves to the caudal. The first dorsal commences behind the seventh scale in the dorsal ridges, or at about one-third of the entire length; it is of the same form as in the *A. cataphractus*, but contains more rays; its membrane terminates at the fifteenth scale, and there are rather more than two scales between it and the second dorsal, which last is rather shorter and higher than the first. The rays of the first dorsal are not stouter than those of the second, nor relatively stouter than those of the *A. cataphractus*. The rays of the second dorsal are simple, with the second and third rather longer than the first. The anal answers to the second dorsal. The pectorals are rounded, and one-fifth of the entire length. Ventrals very narrow, and scarcely more than half the length of the pectorals. Position of the vent a little anterior to a line connecting the extremities of the ventrals.

COLOUR.—(In spirits.) Dusky grey above and on the sides, paler beneath; with four broad transverse blackish fasciæ passing across the back and down the sides as far as the third longitudinal ridge of scales. The first fascia is in the region of the first half of the first dorsal; the second at the commencement of the second dorsal; the third near the end of the second dorsal; the fourth half way between the end of the second dorsal and the caudal; and a little beyond this there is a faint trace of a fifth fascia. The body is a little mottled in places with spots of the same dark colour as the fasciæ, and the fins, with the exception of the ventrals, are of the same hue.

Habitat, Chiloe, (West coast of S. America).

The absence of vomerine teeth has been considered by Cuvier as one of the characters serving to distinguish *Aspidophorus* from *Cottus*; but as these teeth are very distinctly developed in the present species, we must rather dwell upon the large keeled sharp-pointed scales, which envelope the body in a kind of mail, and, as Dr. Richardson observes,\* “give the *Aspidophori* a totally different aspect from the *Cotti*.” Indeed on equally strong grounds as those on which Cuvier has separated *Pinguipes* from *Percis* and *Prionotus* from *Trigla*, the present species, which possesses both vomerine and palatine teeth,† might be made a distinct

\* Faun. Bor. Amer. Part Third, p. 49.

† Is it not possible that this may be found to be also the case with several of the foreign species described by Cuvier, in which the absence of these teeth has been rather presumed than ascertained from actual examination?

genus from *Aspidophorus*, or at least considered as one of its subgenera. But in the present uncertain state of our knowledge with respect to the exact value of this character,\* and from the general resemblance of the *A. Chilensis* in all its principal characters to the other species of this genus,† I have not thought this step necessary.

This species was taken by Mr. Darwin at Chiloe. There are two specimens in the collection. The second differs from the one above described, only in having one ray less in the first dorsal, and two more carinated scales in each of the dorsal ridges. Independently of its having vomerine and palatine teeth as above noticed, this species will not enter into any of Cuvier's sections of the genus *Aspidophorus*, but combines in itself the characters of his first and third; the dorsals being separated by nearly three scales, the jaws being very nearly equal, the rays of the first dorsal not stouter than those of the second, and the throat being bearded.

PLATYCEPHALUS INOPS. Jen.

*P. capite longo, laevi, ubique inermi, spinis duabus ad angulum preoperculi brevissimis æqualibus exceptis; oculis magnis, arcuè propinquantibus: dorso et lateribus fuscis; abdomine albido; pinnâ dorsali primâ liturâ magnâ irregulari nigro-fusca posticè maculatâ; dorsali secundâ, caudali, et pectoralibus, maculis fuscis parvis; anali et ventralibus ferè omnino nigricantibus.*

B. 7; D. 8—12; A. 12; C. 13, &c.; P. 19; V. 1/5.

LONG. unc. 16.

FORM.—Head very much depressed, and rather longer than in most of the species of this genus; its length being nearly twice its own breadth, and nearly one-third of the entire length. Breadth of the body at the pectorals one-seventh of the entire length: depth at that point half the breadth. Snout rounded horizontally. Lower jaw longest. Gape reaching to beneath the

\* Cuvier seems to have attached much value to the character of teeth on the palate; but I agree with Dr. Richardson, (*Faun. Bor. Am.* Part iii. p. 19.) in considering it “of little importance as a generic character in some families of fish.” And the author last mentioned notices an instance (exactly analogous to that of the *Aspidophorus Chilensis*) in the *Thymallus signifer*, which, he says, “resembles the common grayling very closely in its general form, but differs from it in having palatine teeth.”

† In its general characters it does not depart from the *A. cataphractus* of the British seas, anything like so much as the *A. quadricornis*, and *A. monopterygius* do.



anterior margin of the orbit. A band of sharp velutine teeth in each jaw broadest above; a double semicircular patch of similar teeth on the front of the vomer, and a band all along each palatine as broad as that in the lower jaw. Branchial arches and pharyngeans rough with similar teeth. Tongue free, thin, flat, truncated at the apex with a double emargination in the middle, of equal breadth throughout, without teeth, the central portion cartilaginous with a broad membranous border all round. Eyes large, their diameter one-sixth the length of the head, approximating, with not half a diameter between, distant two diameters from the extremity of the lower jaw. The spines of the preopercle (which in some species are long and very unequal) very short and inconspicuous, of equal length, the lower one rounded off almost to nothing. Head smooth all over; presenting the usual ridges, which however are not very salient, but with hardly anything deserving the name of spines, excepting only a small flat spine terminating the opercle, and a minute but sharp one on the upper ridge of the scapula: none at the anterior angle of the first suborbital, or on the ridge of the orbit. Gill opening very large; the branchial membrane notched underneath for its whole length.

Pectorals broad and oval but short, contained nearly eight times in the entire length; the first two rays simple, the next ten branched, the last seven, which are rather stout, again simple. Ventrals separate by nearly the whole breadth of the body, attached beneath the middle of the pectorals, longer than these last fins by nearly one-third, and reaching very nearly but not quite to the vent, which is a little posterior to the middle of the entire length: the spine of the ventrals is one-third of the longest of the articulated rays which are the last or innermost. The first dorsal commences above the middle of the pectorals, and occupies between one-sixth and one-seventh of the entire length; its greatest height is about two-thirds of its own length; the first spine is very short, and detached, as in the other species; the second a little shorter than the third which is longest; the rest gradually decrease to the last, which is one-third the length of the second; this fin therefore is not so triangular as in many of this genus. A small space between the first and second dorsals. This last longer and rather lower than the former, contained four and a half times in the entire length; all the rays nearly even, with the exception of the first only, which is a little shorter than the second. Caudal square. The anal answers to the second dorsal, but begins, as well as terminates, a little backward.

The lateral line commences at the suprascapular, and gradually bends down till it reaches the middle of the depth which it keeps for the remainder of its course; it is perfectly smooth throughout. The scales cover all the body and a part of the head, but are not present between the eyes, or on the front of the snout, or on the jaws. They are small, oblong-oval, finely striated, with a fan of eleven or twelve deeper striæ posteriorly, their free edges cut square, not ciliated.

COLOUR.—(*In spirits*.)—Back and sides nearly uniform deep brown; beneath white; the two colours separated by a well-defined line. First dorsal transparent, with a deep brown stain or blotch on the membrane, of an irregular form, and occupying more than the posterior half of the fin. Second dorsal uniformly, but rather obscurely, spotted throughout. Caudal with transverse rows of similar spots. Anal nearly uniform pale dusky, the spots hardly distinguishable from the ground. Ventrals the same. Pectorals with spots on the rays, but with the intervening membrane nearly transparent.

Habitat, King George's Sound, New Holland.

This species very closely approaches the *P. lævigatus* of Cuvier and Valenciennes, with which it particularly agrees in the smoothness of its head, and large approximating eyes. The two spines, however, at the angle of the preopercle appear to be still smaller than in that species;\* the fin-ray formula is a little different; and so also are the colours; the first dorsal being particularly characterized by a large irregular dark-coloured stain on its posterior portion, and the anal and ventrals being almost wholly dusky, instead of pale with spots on the rays only, as in the *P. lævigatus*. Possibly it may be a mere variety. Mr. Darwin's specimen was obtained at King George's Sound.

# FAMILY—SCORPÆNIDÆ.

SCORPÆNA HISTRIO. *Jen.*

PLATE VIII.

*S. toto corpore coccineo, pinnis pallidioribus, maculis parvis irregularibus nigricantibus: capite magnâ ex parte alepidoto, lineis spinosis solitis armato: pinnâ dorsali spinis inæqualibus, tertiâ paulo longissimâ: capite et lateribus cirris cutaneis parvis ubique adornatis; quatuor palpebralis, præsertim duobus posterioribus, majoribus, palmatis.*

B. 7; D. 12/9; A. 3/5; C. 13, &c.; P. 20; V. 1/5.

LONG. unc. 9.

FORM.—General form resembling that of the *S. Scrofa*. Depth at the pectorals just one-fourth of the entire length. Thickness a trifle more than two-thirds of the depth. Head more than one-third of the entire length. Eyes large and elevated, distant from the end of the snout rather more than one diameter; the space between very concave, twice as long as broad, with two whitish lines in the central furrow, diverging as they recede backwards towards the nape, but scarcely elevated into salient ridges. Mouth oblique, with the gape large and the lower jaw a little the longest; when closed, the end of the maxillary, which is broad and much dilated, reaches to a vertical line from the posterior part of the orbit. A broadish band of velutine teeth in each jaw as well as on the vomer and palatines. Tongue smooth. A small sharp triangular spine on each of the nasal bones, (in this specimen that on the left side is double or forked): upper margin of the orbit, which is much elevated, with three spines, one strong one at the anterior angle, and two, nearly as large, further back; beyond which, on the left orbit only, is a fourth smaller one. Space between the eyes bounded posteriorly by a raised arc

\* Judging from the figure in the "Voyage de l'Astrolabe (Zoologie)," pl. 10. f. 4.



having the curvature inwards, with a spine on each side; this is followed by the depressed occiput, which forms a hollow; and on each side of this, at its posterior margin, or at the commencement of the nape, are two other strong spines: there are likewise two spines at the suprascapulars, and between these and the posterior margin of the orbit of the eye, on what may be called the temples, are two more; of these last, the first, which is small and close to the orbit, is double; the second, which is larger and situate a little above the upper angle of the preopercle, is, in this specimen, double on the right side and single on the left. The first suborbital has two spines on its anterior margin, the first directed forwards, and the second downwards; on its disk are two salient ridges, which are unarmed, and not very conspicuous. The second suborbital is entirely without spines, but elevated in the middle into a double smooth ridge or crest. Margin of the preopercle with six spines; the second longest; the first, as well as the two lowermost, small and inconspicuous. Opercle with two osseous diverging ridges terminating in spines: the scapular and clavicular bones likewise terminate each in a flattened spine. Lateral line and scales much as in *S. Scrofa*; the latter with their free edges perfectly smooth.

The cutaneous filaments and appendages on this species are as follows: three small ones at the extremity of the snout; one small but broad one at the upper margin of the anterior orifice of the nostril; two very conspicuous palmated ones on each orbit, especially the posterior one, which is largest, and very broad; two on the margin of the first suborbital; some small ones on the cheeks and maxillaries; six beneath the lower jaw, two being near the symphysis, and two on each ramus; a row on the margin of the preopercle, and very numerous small ones scattered about the nape and sides of the body, of which a row along the lateral line are rather more conspicuous than the others.

The spines of the dorsal fin are moderately strong, and unequal; the first is rather more than half the length of the second, which itself is two-thirds of the third; this last is less than half, but more than two-fifths, of the depth of the body; from the third, the spines decrease very gradually to the eleventh, which is a little longer than the first; the twelfth is higher than the eleventh by one-third: soft portion of the fin rounded, and where most elevated just equalling in height the third or longest spine. Anal spines very unequal; the first not very stout, and less than half the length of the second, which is very strong indeed, as well as the longest of the three; the third is stouter than the first, but not nearly so stout as the second, though nearly equalling that spine in length: soft portion of this fin with its greatest elevation rather exceeding the second spine. Caudal slightly rounded. Pectorals rather more than one-fifth of the entire length; the ten lowermost rays simple; the nine immediately above these branched; the uppermost of all simple like the bottom ones, but slenderer as well as shorter than the others. Ventrals not above two-thirds the length of the pectorals; in other respects as in *S. Scrofa*.

*A second specimen.*—Smaller than the one above described, measuring seven inches and a half in length. The two diverging lines on the cranium between the eyes are rather more salient, and the left orbit is without the fourth spine; but in all other respects, including the fin-ray formula, the two specimens are exactly similar.

*COLOUR.*—"Whole body scarlet red, fins rather paler; with small irregularly-shaped light black spots."—D.

Habitat, Chatham Island, Galapagos Archipelago.

This species differs more or less in the details of form, as well as colours, from all those which I can find described by authors. Most of the foreign species of this genus noticed by Cuvier and Valenciennes, come either from the eastern coast of America or the East Indies; and they do not appear to have received any from that part of the Pacific, whence the present one was obtained.

SEBASTES OCLATA. *Val.*?

*Sebastes oculata, Cuv. et Val. Hist. des Poiss. tom. ix. p. 344.*

*FORM.*—Greatest depth contained about three times and three quarters in the entire length. Head about one-third of the same. Eyes large; the interocular space, equalling rather more than half their diameter, concave, with two longitudinal ridges running respectively parallel to the two superciliary ridges. Two spines on the upper part of the snout, in a line with the nostrils; one at the anterior part of the orbit; three at the posterior, passing off in a line towards the occiput, where there are two other moderately strong ones terminating the lateral occipital ridges; five very strong spines or teeth edging the rounded angle of the preopercle; two sharp ones at the posterior angle of the opercle, the upper one most developed; one at the scapula, and two at the suprascapular. There are either three orifices to each nostril, or else, adjoining the two usual openings, a large pore so manifest (at least in this specimen in its dried state) as easily to be mistaken for a third: this additional one is close to the nasal spine. Dorsal spines of only moderate strength: anal stronger, especially the second, which is very stout, as well as the longest of the three; the third, however, is more than half the length of the soft rays. Pectorals broad and rounded; their length contained about four times and a half in the entire length; first ray simple, the next eight branched, the nine lowermost simple again, and rather stouter than the others. The caudal appears to have been square. Scales small and ciliated, covering nearly the entire head, as well as body, but very thinly scattered on the extremity of the snout in advance of the nostrils.

D. 13/14; A. 3/6; C. 14, and 3 shorter ones; P. 18; V. 1/5.

Length 10 inches.

*COLOUR.*—"Under surface, sides, branchial covering, and part of the fins, 'tile and carmine red;' dorsal scales pale yellowish dirty brown."—D. In its present dried state, the colour is of a uniform brown.

Habitat, Valparaiso.

This species is probably the *S. oculata* of Valenciennes; but the depth rather exceeds, and in its recent state it must have still more exceeded, one-fourth



of the entire length, the proportion given in the "Histoire des Poissons." The spines on the opercle and suprascapular also can hardly be called "smaller," as there stated, than those on the orbit and occiput, at least the upper one on the opercle. There are also two soft rays less in the anal. It may be added further, that Mr. Darwin's notes make no mention of the four brilliant rose-coloured spots along the base of the dorsal fin, spoken of by Valenciennes.

The *S. oculata* was discovered by M. Gay at Valparaiso, where Mr. Darwin's specimen also was obtained. It is the only species of this genus on record brought hitherto from South America. It may be stated, however, that Mr. Darwin has a drawing of another species, made by Mr. P. King, found also at Valparaiso, differing from the above in having the spines on the head less developed, and apparently, in some of its characters, approaching the *S. variabilis*. This last is a species inhabiting the sea which separates N. America from Kamtschatka.

AGRIOPUS HISPIDUS. *Jen.*

PLATE VII. FIG. 2. Twice nat. size.

Fig. 2 *a.* Nat. size.

Fig. 2 *b.* Portion of the hispid cuticle magnified.\*

*A. pallidè rubro-aurantius, dorso nigricante, pinnis nigro-maculatis: corpore hispido, altitudine tertiam partem longitudinis æquante; spinis nasalibus duabus parvis recurvis; vomere dentibus velutinis minutissimis instructo: pinnâ dorsali inæquali, anticè allevatâ, spinis quartâ et quintâ paulo longissimis, succedentibus gradatim diminutis, ultimâ radiis articulatis multò breviori.*

D. 17/13; A. 1/8; C. 13, &c.; P. 9; V. 1/5.

LONG. unc. 1. lin. 9.

FORM.—General form resembling that of the *A. torvus*, but the depth much greater, equalling one-third of the entire length, or very nearly. Length of the head somewhat less than the depth of the body. The line of greatest depth passes through the insertion of the pectorals. The profile viewed apart from the superciliary ridges, which are sharp and prominent, falls in a straight but very oblique line from the commencement of the dorsal to the mouth. On each side of the median line of the snout, in advance of the eyes, is a small but sharp spine, directed upwards and backwards. There are also two minute spines on the first suborbital immediately above and behind the end of the maxillary; these are placed one over the other, the uppermost, which is the sharpest and most conspicuous, taking an upward direction like the

\* Called by mistake in the plate "magnified scales."

nasal spines, the lowermost, which is blunt and not so obvious, a downward one. Mouth small, without any teeth that can be discerned even with a lens; but a decided roughness can be felt on the vomer, seeming to indicate the presence of minute teeth on that part. The superciliary ridges, already alluded to, are slightly granulated, and terminate behind in two sharp triangular points. The occipital ridges, a ridge on the posterior suborbital immediately beneath the eye, and an interrupted ridge on the temples and suprascapulars, are in like manner granulated, or rather obscurely crenated. The opercle and preopercle are marked with a few striæ, but show neither granulations nor spines. Gill-opening very small. No scales on any part of the head and body; but the whole surface of the latter is hispid with minute bristly appendages to the cuticle, each springing from a minute papilla. There are also a number of fine lines traversing the cuticle in two directions, and forming a kind of net-work. The lateral line commences at the suprascapular, and terminates a little beyond the end of the dorsal, not reaching quite to the caudal; its course is nearly, but not exactly, parallel to the dorsal line, the distance between them being at first one-third, but towards the caudal between one-third and one-fourth of the depth.

Dorsal very much elevated anteriorly, but its height by no means uniform throughout; the first spine one-fourth shorter than the second; this again a little shorter than the third; and this last a very little shorter than the fourth and fifth, which are longest, and which equal three-fourths of the depth of the body; sixth and succeeding ones gradually decreasing, the ninth being about equal to the first, the twelfth about one-third shorter; the next four are scarcely shorter than the twelfth, and the seventeenth or last is a little higher than the sixteenth; then follows the soft portion of the fin, which is here again elevated, the soft rays being nearly double the length of the last spinous.\* The anal answers in position to the first two-thirds of the soft dorsal, terminating before that fin, as in *A. torvus*: the fourth, fifth, and sixth soft rays are longest, and much longer than the soft rays of the dorsal; the spine is short and slender, and not much more than half the length of the first soft ray. The last ray of both dorsal and anal is divided quite to the root so as to appear as two. The caudal appears to have been rounded, but the ends of the rays are worn and broken. Pectorals long, equalling one-third of the entire length: they consist of nine rays, the three middle ones of which are longest; the three upper and the three lower ones are respectively equal; all the rays simple. Ventrals much shorter than the pectorals, and, though attached rather more behind, not reaching so far; their spine is rather stout, much more so than that of the anal, and about three-fourths the length of the first two soft rays, which are the longest in the fin.

COLOUR.—"Pale reddish orange, with black spots on the fins, and a dusky shade on the back."—D.

A second specimen only differs from the above in having the teeth in the jaws more sensible to the touch, though still scarcely to be seen; and in the superciliary and occipital ridges being less granulated or crenated at the edges. The colours also are a little darker. The fin-ray formula is exactly the same in both specimens.

Habitat, Peninsula of Tres Montes, Archipelago of Chiloe.

This species approaches most nearly the *A. Peruvianus* of Cuvier and Valenciennes, with which it agrees in the great depth of the body, and in the

\* This portion of the fin is not quite correctly represented in the plate, being made too low, in consequence of the rays having been broken at their extremities in the specimen figured.



presence of two nasal spines; but it differs in the roughness of the skin (that species being described as smooth), and in the greater inequality of the dorsal fin. Perhaps it may be the same as the species brought from the coast of Chili by Mr. Cuming, and briefly noticed by Mr. Bennett in the "Proceedings of the Zoological Society" (1832, p. 5.), but which this last gentleman did not venture to describe as new, from the circumstance of its general agreement with the *A. Peruvianus*. The principal deviation in Mr. Cuming's fish from the species just mentioned is stated to have occurred in the number of the fin-rays; those of the spinous portion of the dorsal fin being seventeen (one less than in the *A. Peruvianus*), while of the soft rays of the anal there were ten (three more than in the species referred to). Mr. Darwin's fish agrees with Mr. Cuming's in the number of the dorsal spines, but not in that of the soft rays of the anal, which is eight, being one more than in the *A. Peruvianus* and two less than in Mr. Cuming's; and it is observable that both the specimens obtained by Mr. Darwin agree in this particular. Mr. Bennett has not noticed any of the other characters of Mr. Cuming's fish.\*

One of the most distinguishing peculiarities in the species here described is the existence of vomerine teeth, which though extremely minute are quite sensible to the touch. As these teeth are denied by Cuvier to the whole genus, we have here another instance, similar to that of the *Aspidophorus Chiloensis* already mentioned, of the slight value of the character which their presence or absence affords. Possibly, however, they may disappear in the adult state. Both Mr. Darwin's specimens are small, neither equalling two inches; and if they are immature, which is probably the case, some of the other characters mentioned in the description, perhaps even the hispidity of the skin, may result from this circumstance. They must therefore be received with caution until larger specimens shall have been obtained.

\* Since the above was printed, Mr. Waterhouse has been kind enough to show me in the museum of the Zoological Society the specimen which he believes to be the one procured by Mr. Cuming. Unless the characters are very much altered by age, it is decidedly distinct from the *A. hispidus* above described. The general form indeed is the same; but the skin is perfectly smooth, marked with vertical striæ; the granulated ridges on the head are less prominent, and the superciliary ridges without spines. The fin-ray formula is not quite as stated by Mr. Bennett, who appears, in his computation, to have mistaken the last dorsal spine for one of the soft rays of that fin, and also to have over-estimated the number of soft rays in the anal. The formula is really 18/12; A. 1/9, &c. I have no doubt of Mr. Cuming's fish being the true *A. Peruvianus*; whilst the one here characterized as new is probably the young of a nearly allied species. Mr. Cuming's specimen is six and a half inches long.

It may be advantageous to science to mention here, though not immediately connected with the present inquiry, that another species of *Agriopus* in the museum of the Zoological Society, which was seen by M. Valenciennes during his visit to this country, and referred by him in the "Histoire des Poissons" to the *A. verrucosus*, proves not to be that species, but the *A. spinifer* of Dr. Smith, recently described by him for the first time in his "Illustrations of the Zoology of South Africa."

## FAMILY.—SCIÆNIDÆ.

OTOLITHUS GUATUCUPA. *Cuv. et Val.*

Otolithus guatucupa, *Cuv. et Val.* Hist. des Poiss. tom. v. p. 56. pl. 104.

FORM.—Elongated, with the back only very slightly elevated beneath the first dorsal: in advance of that fin the dorsal line is nearly straight, and continuous with the profile. Greatest depth contained exactly four times and a half in the entire length. Head long, contained three and a half times in the same. Lower jaw projecting considerably beyond the upper, and ascending to meet it. Two strongly developed curved canines at the extremity of the upper jaw; the rest of the teeth in this jaw consist of a single row of fine card, nearly equal throughout: in the lower jaw there are no canines, but one similar row of card, rather stronger than those above, and not equal, the smallest being in front, and those at the sides becoming gradually larger as they extend backwards. No vestige of scales on the lower jaw, lips or maxillary; but the suborbital is covered with bright silvery scales. Eye full, and moderately sized; its diameter one-fifth the length of the head; its distance from the end of the upper jaw equalling the diameter. Margin of the preopercle with a few indistinct striæ and obsolete denticulations. Opercle with two flat points not much developed. Lateral line very distinct, commencing at rather less than one-third of the depth, but curving gradually downwards to one-half; continued to nearly the extremity of the caudal; each scale marked with an elevated line, from which there proceed one or two small ramifications on each side.

First dorsal triangular, with the first spine very short, the fourth longest, the fifth and succeeding ones gradually decreasing, the last or tenth being shorter than the first. Second dorsal almost contiguous, its spine or first ray about equalling the first ray of the first dorsal: this fin is more than half as long again as the first, and the rays are nearly even. The anal commences further back than a point opposite the middle of the second dorsal; there are in reality two spines in this fin, but the first is so extremely minute as to be almost microscopic, and not seen, unless very carefully sought for; the second or principal spine is weak, and rather more than one-third the length of the soft rays. Caudal apparently square, but the rays being worn at the tips, its exact form cannot be determined. The second dorsal, as well as the anal and caudal, are partially covered with small scales, which, however, are not very obvious. Pectorals narrow and rather small, being scarcely more than half the length of the head. Ventrals placed a little further back, and rather shorter than the pectorals.

B. 7; D. 10—1/20; A. 1/8; C. 17; P. 16; V. 1/5.

Length 9 inc. 9 lines.

COLOUR.—"Silvery white, above iridescent with violet purple and blue."—D. Mr. Darwin has not noticed the dark transverse lines, which descend from the back obliquely forwards, as repre-

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sented in the 'Histoire des Poissons,' and of which there are evident traces, though apparently much effaced by the action of the spirit.

Habitat, Maldonado Bay, Rio Plata.

This species, which Cuvier and Valenciennes consider as the *Guatucupa* of Margrave, was obtained by Mr. Darwin at Maldonado. M. D'Orbigny had previously taken it at Monte Video. The only respects in which Mr. Darwin's specimen differs from D'Orbigny's, is in its having two more rays in the soft dorsal, and a slightly longer anal spine, judging from the figure in the 'Histoire des Poissons;' but I cannot imagine that they are distinct on these grounds only, so exactly do they agree in all their other characters.

CORVINA ADUSTA. Agassiz.

*Corvina adusta*, Spix et Agass. Pisces Brazil. p. 126. tab. 70.

FORM.—Greatest depth beneath the commencement of the first dorsal fin, and equalling one-fourth of the entire length. Back somewhat carinated, and moderately arched, forming one continuous curve with the profile, which falls with considerable obliquity. Ventral line nearly straight, and the abdomen much flattened in front of, and between the ventrals. Length of the head just equalling the depth of the body. Snout obtuse, with two small lobes at bottom, one on each side of the extremity, as in several other species of this genus. Mouth horizontal, at the bottom of the snout; when closed, the maxillary reaching a little beyond a vertical from the anterior margin of the orbit. Four pores beneath the symphysis; and seven, in two rows, round the extremity of the snout; those in the lower row large. Jaws nearly equal; the upper one perhaps a little the longest. Teeth forming a velutine band above and below; those above with an outer row of somewhat longer and stronger ones. Eyes rather small; their diameter about one-fifth the length of the head. Nostrils consisting of two round apertures in advance of the eye, the posterior one largest; the anterior with a raised margin. Preopercle a little less than rectangular, with the angle at bottom somewhat rounded: the ascending margin rectilinear, sloping rather in advance of a vertical, and distinctly toothed, the teeth becoming smaller upwards: at the angle are two stronger teeth or spines, the uppermost directed backwards and a little downwards, the lowermost downwards and a little backwards; between these two teeth there is an interval; the basal margin of the preopercle is quite smooth. Opercle terminating in two flat inconspicuous points.

Snout, cheeks, and gill covers, covered with scales of very unequal sizes: those serving as a boundary between the cheek and the preopercle, also a row above each orbit, a few at the upper angle of the opercle, some on the suprascapular lamina, and a row extending thence upwards and forwards to the occiput, much smaller than the others. Scales on the body of moderate size, arranged in oblique rows; about fifty-five in a longitudinal line, and nineteen or twenty in a vertical. One taken from above the lateral line, and nearly in the middle of the length, is oblong, approaching to circular, its surface marked with a number of concentric,

much crowded, curved lines, somewhat undulating behind, with a fan of about twelve deeper striae converging to a point considerably in advance of the centre of the scale; the free portion is also marked with several well-marked nearly parallel lines which terminate in denticles at the anterior margin. Those on the lateral line have the mucous tubes somewhat ramified, and are accompanied throughout its course by some minuter scales, similar to those on the head above pointed out. The lateral line is at one-third of the depth, till it arrives beneath the middle of the soft dorsal, where it falls to one-half.

First dorsal of a triangular form, separated from the soft portion by a deep notch; the first spine very small and inconspicuous; the second somewhat shorter than the third; fourth longest, nearly equalling half the depth; all the spines in this fin rather slender. The second dorsal commences with a spine somewhat longer than the last spine in the first dorsal, and not quite half the length of the first soft ray; soft rays nearly even throughout, and not equalling the highest point of the first dorsal. Anal short and somewhat rounded, commencing beneath the middle of the second dorsal, and double the height of that fin; its first spine very short and inconspicuous; second long and moderately stout, but shorter than the first soft ray by one-third; second soft ray the longest; third and succeeding ones gradually decreasing. Pectorals narrow and pointed, shorter than the head; first ray simple, the rest branched; third, fourth and fifth longest. Ventrals attached a trifle backward than the pectorals, which they do not equal in length; the spine much slenderer than that of the anal, and rather more than half the length of the first soft ray. Caudal squarish, but with the margin a little sinuous.

B. 7; D. 10—1/28; A. 2/3; C. 17; P. 17; V. 1/5.

Length 8 inches 6 lines.

COLOUR.—“Above inclining to coppery, with irregular transverse bars of brown; beautifully iridescent with violet.”—D. The bars alluded to by Mr. Darwin are some dark lines which, commencing at the upper part of the back, pass forwards and downwards in an oblique direction; they bend more and more downwards as they advance, and disappear a little below the middle. The whole fish has a metallic gloss, particularly about the cheeks and gill-covers, and very visible even in its present state.

A second specimen, exactly similar to the above, is nearly twelve inches in length.

Habitat, Maldonado and Monte Video.

I entertain no doubt of this species being the *C. adusta* of Agassiz, figured in Spix's Fishes of Brazil. It is not described by Cuvier and Valenciennes, but belongs to their second section of the genus, characterized by the small spines on the ascending margin, and especially at the angle, of the preopercle. It seems to be particularly distinguished by the small scales on some parts of the head, and along the lateral line where they accompany the larger ones. These characters have not been overlooked by Agassiz. There are two specimens in the collection, the larger one taken at Monte Video, the smaller at Maldonado.



1. *UMBRINA ARENATA*. Cuv. et Val.*Umbina arenata*, Cuv. et Val. Hist. des Poiss. tom. v. p. 141.

FORM.—Rather elongated, with the back very little arched; the greatest depth contained about five times and a quarter in the entire length. Length of the head about equal to the depth of the body. Profile falling very gradually, and nearly in a straight line, in front of the dorsal. Snout very much projecting; the margin at bottom, above the upper jaw, divided into four lobes which are cut square at their extremities. Round the end of the snout, and immediately above the lobes, is a double row of pores, the lower ones large. Also four pores beneath the symphysis of the lower jaw. Barbule at the chin scarcely exceeding a line or a line and a half in length. A band of velutine teeth in each jaw, with an outer row in card; these last moderately strong, sharp, and rather wide apart, not above fourteen or sixteen in the row. Preopercle very obsoletely denticulated. Opercle with two flat points not much developed.

First dorsal triangular; the first spine very small; the second, third and fourth elevated rather in a point, the third equalling two-thirds of the depth of the body or more. Second dorsal nearly twice the length of the first. Anal commencing opposite the sixth soft ray of that fin, short, and terminating considerably before it; the anal spine weak, and very little more than half the length of the soft rays. Caudal with the posterior margin sinuous, the upper part being slightly crescent-shaped, the lower portion rounded, and broader than the upper. Pectorals a very little shorter than the head. Ventrals attached a little behind the pectorals, and not passing beyond them. In the axilla of the pectorals is a small triangular membranous lamina: there is also a narrow pointed one in the axilla of the ventrals covered with scales. The scales on the body are thin, rather small, somewhat rhomboidal, with their free margins ciliated, and with a fan of twelve striæ behind.

B. 7; D. 10—1/25; A. 1/8; C. 17; P. 21; V. 1/5.

Length 9 inches 6 lines.

COLOUR.—“Body mottled with silver and green: dorsal and caudal fins lead-colour.”—D. *In spirits*, the colour appears dusky brown, with darker mottlings and silvery reflections; paler beneath. The fins are dusky, but the basal half of the dorsal is darker than the upper. The pectorals are darker than the other fins, especially the inside; on the left pectoral, the dark colour is restricted to three broad transverse fasciæ. There are also on the pectorals and anal, and on most of the scales on the body, small blackish dots, as mentioned in the ‘Histoire des Poissons.’

A second specimen, smaller than the above, has the back rather more arched, the greatest depth being only five times in the length. The outer row of teeth in the upper jaw is not quite so conspicuous, the teeth being smaller and closer-set, and consequently more numerous. The soft dorsal and anal have fewer rays.

D. 10—1/22; A. 1/7; &amp;c.

Length 7 inches 3 lines.

In all other respects similar to the specimen first described.

Habitat, Bahia Blanca, and Maldonado.

As Cuvier and Valenciennes have mentioned individuals of this species, which varied in the number of rays in the soft dorsal from twenty-two to twenty-four, I cannot but consider the two above described as specifically the same, though in the first these rays amount to as many as twenty-five. This, which is the larger specimen, was taken by Mr. Darwin at Bahia Blanca, where it is said to have been common. The other was obtained at Maldonado.

2. *UMBRINA OPHICEPHALA*. Jen.

*U. elongata*; rostro obtusissimo, tumido, haud ultra fauces producto, margine inferiore quadrilobato, lobis intermediis rotundatis; fossulâ longitudinali inter nares, profundè exarata; poris quatuor infra symphysin; dentibus velutinis, serie externâ in maxillâ superiore aculeiformi; preoperculo obsoletè denticulato; operculo mucronibus duobus parvis instructo; spinis dorsalibus tertiâ et quartâ longissimis, corporis altitudinem æquantibus; spinâ anali gracili, radiis articulatis dimidio breviori.

D. 12—1/22; A. 1/9; C. 17; P. 20; V. 1/5.

LONG. UNC. 6. lin. 5.

FORM.—Very much elongated; the greatest depth just one-sixth of the entire length; the head one-fifth. Dorsal line nearly straight. Profile falling very slightly till it reaches the nostrils, when it suddenly becomes vertical. Snout in consequence short, and very blunt, and not projecting beyond the jaws; with a deep broad channel down the middle, extending from between the nostrils to near the mouth: on each side of this channel, the snout is very protuberant. The lower margin of the snout is divided into four lobes, the central pair of which are rounded: above each of the exterior lobes is one large pore, and an odd one in the middle. There are also four pores beneath the symphysis, and a short barbule, as in the last species. The eye has a diameter about one-fifth the length of the head, and is distant one diameter from the end of the snout. The nostrils, which are immediately in advance of the eye, consist of two round apertures, one before the other, the posterior one double the size of the anterior. Upper jaw a very little longer than the lower. A band of velutine teeth in each jaw; with an outer row above of moderately strong card, rather curving inwards and backwards, and closer-set than those of the *U. arenata*, amounting to twenty-eight or thirty in number: there are also some smaller card teeth behind this outer row passing insensibly into the velutine. Preopercle very obsoletely denticulated. Opercle with two flat points not very obvious.

First dorsal triangular, and moderately high in the point; third and fourth spines longest, about equalling the depth of the body; first spine very small: all the spines rather slender. Second dorsal about half as long again as the first, but the rays are too much broken to judge



of their relative lengths. Anal spine very slender, and about half the length of the soft rays. The caudal is injured, but appears to have been of nearly the same form as in the *U. arenata*. The pectorals are about three-fourths the length of the head, but the ends of the rays are worn. The ventrals are of the same length as the pectorals in their present state: they are placed rather backward than in the *U. arenata*, being attached beneath the first third of the pectorals: there is a pointed scale in their axilla, of about the same relative size as in that species. The scales on the body are rather smaller, ciliated on their free edges, with a fan of eleven or twelve striæ behind. There are rows of small scales on the caudal, but none apparent on the other fins.

COLOUR.—Mr. Darwin did not notice the colours of this species in its recent state. *In spirits*, it appears of a nearly uniform dusky brown, but paler on the abdomen, with traces of silvery reflections about the head. The fins are dark, but the anal paler at the base than at the tips of the rays.

Habitat, Coquimbo, Chile.

This species may be at once distinguished from all those described in the 'Histoire des Poissons,' by its very elongated form. The head also has a peculiar character about it, and is not unlike that of some serpents. It appears to be the first species of this genus brought from the Pacific, the other foreign ones being all found either in the Indian seas, or on the Atlantic side of America. There are two specimens in the collection, exactly similar, and both obtained by Mr. Darwin at Coquimbo. They are, however, both in very bad condition; so much so, indeed, that I should have hesitated about describing them as new, had they not presented several obvious peculiarities.

#### GENUS—PRIONODES.\* *Jen.*

*Serrani formam quam maximè gerens. Pinna dorsalis unica, per totam longitudinem subæqualis. Membrana branchialis septem-radiata. Nec fovea, nec pori, infrà symphysin. Dentes maxillares velutini, serie externâ cæteris fortiori, paucis, hic illic sparsis, subcaninis; palatini nulli. Preoperculum denticulatum. Operculum mucronibus tribus posticè armatum. Spina analis secunda fortis. Squamæ corporis ciliatæ; minutissimæ inter radios pinnarum verticalium, in seriebus dispositæ.*

I am called upon either to establish this new genus among the *Sciænidae*, or to break down one of the essential distinctions set by Cuvier between this family

\* *Serræ figuram habens. Α πριων.*

and the *Percidæ*. The form is so completely that of a *Serranus*,—which it resembles especially in its dorsal fin, head, maxillary teeth, form and armature of the pieces of the gill cover, and in the arrangement of the scales on the body,—that at first sight no one would hesitate to refer it to that group; but *the vomer and palatines are without teeth*.\* In this respect, indeed, I consider it an important discovery; as it affords another striking instance of the uncertainty of this character, in cases in which others, which have been generally made subordinate to it, remain constant. It is probable that the time will come, when it will be found necessary to revise some portion of the *Percidæ* and *Sciænidae* with reference to a more correct valuation of this character. For the present, however, I refrain from interfering with the Cuvierian arrangement; and the only alternative is to consider this as a new form among the *Sciænidae*, where it must be placed along with those genera possessing one dorsal fin, and having seven rays in the branchiostegous membrane. Such are *Hæmulon*, *Pristipoma*, and *Diagramma*; from all which, however, it is at once distinguished by the absence of pores at the symphysis and on the lower jaw, and by the much more developed spines on the opercle, and from *Pristipoma* by its having, further, scales on the vertical fins. On the whole, it seems to approach nearest to *Hæmulon*; but the crown and snout are more free from scales than in that genus, and the scales on the body are not set in oblique rows, as is the case in so many of the true *Sciænidae*. The head also has no cavernous appearance about it. This new form is from the Galapagos Archipelago.

#### PRIONODES FASCIATUS. *Jen.*

PLATE IX. Fig. 1.

*P. pallidè flavescens-fuscus, fasciis transversis plurimis suprâ rubescens-nigris infrâ miniatis; pinnis verticalibus maculis parvis ocellatis: vertice, rostro, et maxillis, nudis; preoperculo margine adscendenti denticulato, basali lævi; operculo mucrone intermedio forti; spinis dorsalibus ad apices laciniis investitis; pinnâ caudali subæquali.*

B. 7; D. 10/12; A. 3/7; C. 17; P. 18; V. 1/5.

LONG. unc. 7. lin. 3.

FORM.—Oval, compressed; the back not much arched, forming one continuous curve with the profile, which falls gently from the nape; ventral line less convex than the dorsal. Greatest

\* With the exception of a small rough oblong spot, near the posterior extremity of the left palatine.



depth equalling one-fourth of the entire length; head about one-third; thickness rather less than two-thirds of the depth. Mouth rather wide, with the lower jaw longest. The maxillary dilates at its posterior extremity; it reaches to nearly beneath the middle of the orbit, and does not retire beneath the suborbital. In each jaw a band of velutine teeth; above there is an outer row of longer ones in card, and one or two in front on each side still longer resembling small canines; in the lower jaw there are also a few longer ones, of the same character as these last, interspersed at intervals. Tongue free at its extremity, and, as well as the vomer and palatines, without teeth. Eyes rather high in the cheek; their diameter about one-sixth that of the head. The nostrils consist of two small round orifices a little in advance of the eyes, the anterior one covered by a membranous flap. Margin of the suborbital entire. Preopercle finely denticulated on its ascending margin, which is vertical and slightly convex; but the denticulations almost disappear at the angle, and are not visible at all on the basal margin. Opercle triangular, with three flat spines, the middle one longest, beyond which the membrane projects in the form of an angular process to the distance of three lines. Small scales on the cheeks and preopercle; but none on the crown, snout, first suborbital, maxillary, or lower jaw; scales on the opercle larger, equalling those of the body in size. Gill-opening large, with the branchial membrane deeply notched in the middle.

Lateral line following the curvature of the back at one-fourth of the depth. Scales on the body moderately large: one taken from the middle of the side above the lateral line is of a somewhat oblong form, with the free edge rounded and finely ciliated; the basal portion with fourteen slightly converging striæ, which form at the hinder margin as many, but not very distinct, crenations.

The dorsal commences above the terminating lobe of the opercle, and reaches to within a short space of the caudal: height of the spinous portion, which, with the exception of the first two spines, is nearly even throughout, about one-third of the depth; soft portion rather higher, with the last two rays but one longest, and forming a point backwards; all the soft rays branched. Anal commencing in a line with the soft portion of the dorsal, and terminating a little before that fin; three spines, the second one-third longer than the first, and a little longer than the third, and much the strongest of all; the soft portion of the anal is similar to that of the dorsal, and terminates in like manner in a point behind. Space between the anal and caudal a little less than one-sixth of the entire length. The caudal appears to have been nearly even, or perhaps slightly rounded, but the rays are worn. Rows of very minute scales, not very obvious, between the rays of all the vertical fins. Pectorals slightly rounded; more than half the length of the head; all the rays with the exception of the first two and the last, branched. Ventrals attached beneath, or perhaps a very little in advance of the pectorals; pointed, with the second soft ray longest. No lengthened scale or process of any kind in the axilla of either ventrals or pectorals; neither are the former fastened to the abdomen by a membrane half their own length, as is the case in many of the *Serrani*.

COLOUR.—“Pale yellowish brown, with numerous transverse bars, of which the upper part is reddish black, the lower vermilion red; gill-covers, head, and fins, tinted with the same.”—D. Mr. Darwin has not noticed some small round black spots surrounded by a white border, and having an ocellated appearance, which are very evident on the upper half of the soft portion of the dorsal: there is a faint indication of similar spots on the anal and caudal.

Habitat, Chatham Island, Galapagos Archipelago.

Mr. Darwin obtained one specimen only of this new genus at Chatham Island in the Galapagos Archipelago. It is probably not full-sized.

PRISTIPOMA CANTHARINUM. *Jen.*

PLATE X.

*P. cæruleo-argenteum*, operculo nigro-marginato: pinna dorsali subæquali, spinis ultimis radiis articulatis paulo brevioribus; anali spinâ secundâ forti, longitudinaliter striatâ, radiis articulatis duodecim: preoperculo rectangulato, margine adscendenti, leviter denticulato, basali integro: vertice, buccis, et ossibus opercularibus, squamatis; rostro ultra nares, suborbitalibus, et maxillis, nudis; squamis corporis ciliatis: pinna caudali furcatâ.

B. 7; D. 12/15; A. 3/12; C. 17, et 4 breviores; P. 20; V. 1/5.

LONG. unc. 10. lin. 11.

FORM.—Form oblong-oval, much resembling that of the *Cantharus griseus*. Body compressed, with the dorsal line slightly curved; the profile descending from the nape more obliquely, and in a very regular manner. Greatest depth beneath the commencement of the first dorsal, contained not quite three times and three quarters in the entire length: head rather less than one-fourth of the length. Mouth protractile, but not wide, the commissure not extending to a vertical from the anterior angle of the eye; when closed, the maxillary retires beneath the suborbital, and only just the extremity remains visible. Jaws equal; in each a narrow band of velutine teeth, the outer row somewhat longer than the others, particularly above, where they approach to card. Tongue, palatines, and vomer smooth. Eyes moderate; their diameter rather less than one-fifth of the length of the head; rather nearer the extremity of the snout than the posterior margin of the opercle; the distance between them equalling twice their diameter. Two small pores and a fossule beneath the symphysis of the lower jaw, the latter very distinct. Preopercle rectangular, the angle somewhat rounded; the ascending margin nearly straight and finely denticulated, but the denticulations hardly continued to the angle, and not appearing at all on the basal margin. Opercle with two small flat points, but very indistinct and almost lost in the membrane. Suborbitals large, with their lower margins entire. Crown, cheeks, and pieces of the gill-cover, covered with small scales; but not the snout in advance of the nostrils and eyes, nor suborbitals, nor lower jaw. Suprascapulars marked by a large scale, the margin of which is nearly entire.

Lateral line following the curvature of the back at one-third of the depth; each scale marked with an elevated line without ramifications. A scale taken from above the lateral line is of a somewhat rhomboidal form; the free portion very finely striated, with the margin finely

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ciliated; the concealed portion with eight or nine deeper and more distinct striae, not meeting in the centre to form a fan, and with the basal margin crenated. The scales on the cheeks and opercle are smaller than those on the body, and almost smooth.

The dorsal fin commences in a line with the posterior margin of the opercle, and extends nearly the whole length of the back, rising from a groove as in the *Sparidae*: its height on the whole tolerably uniform throughout: spinous portion occupying more than half the fin; the anterior spines gradually increasing in length to the fourth,\* which equals rather more than one-third of the depth; the succeeding ones nearly even, very gradually decreasing to the last, which is about two-thirds the length of the fourth; all the spines moderately stout: soft portion of the fin even, and rather higher than the last spine. Anal commencing in a line with the third soft ray of the dorsal, and terminating opposite to that fin: the first spine short, but strong; second and third spines equal in length, being about two-thirds the length of the soft rays, but the second much stouter than the third; the second spine is also distinguished from the others by having its surface longitudinally striated: soft rays nearly even, and resembling those of the dorsal. Caudal forked, with the upper lobe a trifle longer than the lower; the basal half covered with minute scales. Pectorals narrow and pointed, about two-thirds the length of the head, with a small fold of loose skin in their axillæ. Ventrals placed a little further back than the pectorals, and somewhat shorter; a long pointed scale in their axillæ, nearly one-third their length.

COLOUR.—“Bluish silvery.”—D.—The colour, as it appears in spirit, is nearly uniform bluish gray, and very similar to that of the *Cantharus griseus*. The gill-cover has a dusky edging posteriorly.

Second specimen.—Smaller than the above, and not quite so deep in the body; the greatest depth contained a trifle more than four times in the entire length; the nape in consequence less elevated, and the profile less oblique. Eyes relatively a little larger, their diameter rather more than one-fifth the length of the head. Preopercle with the posterior margin not so rectilinear, approaching to concave; the angle at bottom projecting in consequence a little backwards; the denticulations not quite so distinct and regular. One ray more in the soft dorsal.

D. 12/16; A. 3/12; C. 17, &c.; P. 19; V. 1/5.

LONG. unc. 9. lin. 2.

COLOUR.—“Silvery; above, shaded with brown and iridescent with blue; fins and iris sometimes edged with blackish brown. Flap of the gill-cover edged with black.”—D.

Habitat, Galapagos Archipelago.

This species, which is undoubtedly new, may be known from most of those described by Cuvier and Valenciennes by its greater number of soft rays in the anal fin. The only ones which equal it in this respect are the *P. Conceptionis* and

\* The third spine is broken, and may have been as long as the fourth.

the *P. fasciatum*; from the former of which it may be distinguished by its greater depth and nearly even dorsal, from the latter by its plain colour free from all conspicuous bands and markings. The dorsal notch is scarcely observable, the eleventh and twelfth spines being nearly equal, and but little shorter than the first soft ray. Its analogy to the genus *Cantharus* among the *Sparidae*, which it resembles as well in colour as in general form, is very striking. There are two specimens in the collection; the one described first above having been taken at Chatham Island, the other at Charles Island, in the Galapagos Archipelago.

# 1. LATILUS JUGULARIS. Val.

*Latilus jugularis*, Cuv. et Val. Hist. des Poiss. tom. ix. p. 369. pl. 279.

FORM.—Elongated, with the dorsal line slightly curved, the ventral nearly straight. Greatest depth contained five times and one-third in the entire length. Head, which much exceeds the depth, four times in the same. Profile very convex above the eyes, whence it falls obliquely to the lips. Snout thick and rounded, resembling that of the *Red Mullet*: mouth protractile, horizontal, placed at the bottom of the snout, the commissure just reaching to a vertical from the anterior part of the orbit. Jaws equal or very nearly so; the lower one perhaps a very little the longest. Maxillary not widening at its posterior extremity. A band of velutine teeth in each jaw, narrowing at the sides as it extends backwards; with an outer row of longer and stronger ones: in the lower jaw, the velutine band does not extend beyond the middle of the sides, the carding teeth being all that are visible. Tongue and palate smooth. Eyes high in the cheeks; large, and of an oval form; their vertical diameter three-fourths of their longitudinal; this last equalling one-fourth the length of the head. Nostrils consisting of two round apertures, the posterior one largest, the anterior covered by a membranous flap. Preopercle with the denticles far apart, and not very obvious, unless the skin be dissected off; the ascending margin rectilinear and vertical; the angle rounded. Bony part of the opercle terminating in a flat point, above which are two other smaller points not so well developed; all the points concealed in the membrane, and scarcely visible from without: beneath the principal point, the membrane is prolonged backwards in the form of a broad flattened bristly point three lines in length. Crown, gill-covers and cheeks, scaly, but not the jaws; snout scaly, except very near the lips. Gill-opening large.

Lateral line at first at one-third of the depth, but falling gradually to one-half. Scales rather small; one taken from immediately above the lateral line of an oblong form, the length being twice the breadth, with its free margin finely ciliated, crenated behind with a fan of nine striae; on scales taken from other parts the number of striae in the fan are more numerous.

One long dorsal fin of nearly uniform height throughout, equalling about half the depth; only four slender spines, gradually increasing in length from the first which is very short; the fourth about three-fourths the length of the first soft ray; soft rays increasing likewise very gradually to the fourth, which with the next five or six are highest; the membrane of the fin very



delicate; all the soft rays branched. Vent in a vertical line with the ninth soft ray of the dorsal. Anal commencing immediately behind it, and answering to that portion of the dorsal to which it is opposite, terminating at the same distance from the caudal; only two slender spines, the first very short; the first soft ray simple, the rest branched. Space between these two fins and the caudal barely one-eighth of the entire length. Caudal nearly even. Pectorals moderately long and narrow, equalling nearly the length of the head; rays branched; fourth, fifth, and sixth longest. Ventrals a little in advance of the pectorals, nearly equalling them in length; of a pointed form, with the third and fourth soft rays longest. In the axilla of the pectorals a vertical scaly membranaceous lamina.

B. 6; D. 4/28; A. 2/22; C. 17; P. 20; V. 1/5.

Length 11 inc. 5 lines.

COLOUR.—(*In spirits.*) Dusky olive on the back and upper part of the sides, yellowish (probably silvery in the recent state) beneath, with faint indications of five or six dark transverse bands, similar to those in the *common perch*. Inside of the ventrals blue.

*Second specimen.*—Smaller than the above, measuring six inches and a half in length, but differing from it in no respect, as regards form, excepting in having the profile not so oblique, and the snout in consequence not so obtuse; the jaws also are exactly equal. Fin-ray formula the same.

COLOUR.—“Beneath brilliant white; head and back clouded with purplish and carmine red; longitudinal and transverse irregular bands of the same.”—D. The bands in this specimen amount to eight in number, and are much more conspicuous than in the larger one above described.

Habitat, Valparaiso, Chile.

The smaller of the two specimens above described was taken by Mr. Darwin at Valparaiso. The number attached to the larger one has been lost, but it was probably taken at the same place, where it had been previously discovered both by M. D'Orbigny and M. Gay. The specimen described by Valenciennes has one soft ray more in the dorsal, and one less in the anal, than either of the above; but in all other respects they tally exactly. As observed in the “*Histoire des Poissons*,” this species has many points of resemblance to *Percis* and *Pinguipes*.

## 2. LATILUS PRINCEPS. *Jen.*

PLATE XI.

*L. elongatus*; corporis altitudine capitis longitudinem æquanti; dentibus velutinis, serie externâ fortiori, aculeiformi; preoperculo margine adscendenti recto, leviter

*denticulato, basali lævi; operculo mucrone unico; rostro, ossibus suborbitalibus, maxillis, limbo preoperculi, et interoperculo, nudis; buccis et cranio squamatis, squamis in vertice spatium angulatum inter oculos occupantibus; pinnis dorsali analique prælongis; spinis analibus parvis, gracilibus, primâ minutissimâ; ventralibus accuratè thoracicis; caudali emarginatâ.*

B. 5?; D. 8/26; A. 2/26; C. 15, &c.; P. 18 vel 19; V. 1/5.

LONG. unc. 20. lin. 6.

FORM.—Elongated; the greatest depth equalling the length of the head, and each contained rather more than four times and a half in the entire length. Snout short and rather obtuse, the profile bending downwards in a curve before the eyes. Mouth nearly horizontal, at the bottom of the snout; when closed, the maxillary, which is not widened at its posterior extremity, and which is very similar in form to that of the last species, reaches nearly, but not quite, to a vertical from the anterior part of the orbit. Lower margin of the suborbital entire. Teeth forming a velutine band in each jaw, widest in front, with a row of stronger ones externally: none on the tongue, vomer, or palatines. Eyes large, and high in the cheeks; their diameter one-fifth the length of the head. Preopercle with the angle at bottom rounded; the ascending margin straight, and nearly but not quite vertical, forming with the basal rather more than a right angle; the former finely denticulated, but not the latter. Opercle terminating in one flat point, not projecting beyond the membrane. The branchiostegous rays appear to be but five in number, but, the skin being dry, there may possibly be a sixth overlooked. Cranium, cheeks, and opercle scaly; but not the snout or jaws, or limb of the preopercle, or interopercle: the scales on the crown are separated from the naked skin of the snout by a well-defined line, which forms an advancing angle between the eyes.

Lateral line straight, and continued to the base of the caudal; its course parallel to the back at between one-fourth and one-third of the depth. Scales on the body rather small, oblong, longer than broad, with their free extremities dotted and finely ciliated; the concealed portion striated finely at the sides, and more deeply at the base; but all the central portion, including an oblong area of the same form as the entire scale, without striæ, being only very minutely roughened or punctured.

One long dorsal, low, and of nearly uniform height throughout, commencing about in a line with the insertion of the pectorals, and reaching very nearly to the caudal: eight spines, rather slender, and very gradually increasing in length, the last being just twice the length of the first and equalling the distance from the base of the fin to the lateral line: the soft rays which follow are nearly even with the last of the spinous till the twenty-fourth, which is slightly prolonged in a point, and which is followed by two others shorter than the rest; the ends of the rays are rather worn, but they appear to have been all branched. Anal also long, commencing at about the middle of the entire length, or in a line with the sixth soft ray of the dorsal, and terminating opposite to that fin, to the last half of which, or rather more than half, it exactly answers; only two spines, which are so slender and minute, especially the first,



and so closely united to each other as well as to the first soft ray, as to be scarcely obvious except upon dissection; all the soft rays, except the first, branched. Space between the anal and caudal not a tenth part of the whole length. Caudal slightly notched, or hollowed out, with rows of scales between the rays. Pectorals pointed, about three-fourths the length of the head, with the seventh and eighth rays longest; rows of scales at the base between the rays: in their axillæ a somewhat projecting vertical scale or lamina, as in the last species. Ventrals immediately beneath the pectorals, also pointed, but shorter.

COLOUR.—“Above, and the fins, obscure greenish; sides obscure coppery, passing on the belly into salmon-colour. Pectorals edged with dull blue. Iris yellowish brown: pupil black-blue.”—D.—The skin has dried to a nearly uniform brown.

Habitat, Chatham Island, Galapagos Archipelago.

I feel but little hesitation in referring this species, which is one of the many new ones obtained by Mr. Darwin in the Galapagos Archipelago, to the genus *Latilus*. The absence of vomerine and palatine teeth requires it to be placed, according to Cuvier's views, among the *Scienidae*; in which family, there is no other group besides *Latilus*, to which it makes any approach. It agrees with that genus in its general form, and in many of its particularities; it has the same form of snout, mouth, maxillary, and dentition; the same scaly lamina in the axilla of the pectorals; the same long undivided dorsal and anal fins, with only two very small anal spines, so closely united to the first soft ray as to be easily overlooked. But it may be at once distinguished from the *L. argentatus* and the *L. doliatus*, the only two species described by Cuvier and Valenciennes in the body of their work, by its much more numerous soft rays in the dorsal and anal fins. From the *L. jugularis* last described, which resembles it in this respect, it differs in its thoracic ventrals, shorter head, naked snout and suborbital, and notched caudal: the profile also falls less obliquely. There is only one specimen in the collection, a dried skin and rather injured.

#### HELIASES CRUSMA. Val.

*Heliases Crusma*, Cuv. et Val. Hist. des Poiss. tom. ix. p. 377.

FORM.—Oval, very much compressed. Back considerably elevated, particularly at the nape, whence the profile descends very obliquely, and, with the exception of a slight concavity before the eyes, in nearly a straight line. Greatest depth at the commencement of the dorsal, equalling nearly half the entire length, caudal excluded. Head contained four and a half times in the same. Snout short: mouth small, a little protractile: lower jaw rather the longest. A narrow

band of velutine teeth in each jaw, with the outer row in fine card; these last longest and strongest in front. Eyes large; their diameter nearly one-third the length of the head. Sub-orbitals forming a narrow curved band beneath the eyes, and covered by a row of scales. Nostrils with only a single, small, round aperture. Preopercle with the ascending margin vertical, not quite rectilineal, inclining slightly inwards towards the angle, which is rounded. Opercle, taken together with the subopercle, very regularly curved, the margin describing nearly a semicircle, with one flat point to terminate the osseous portion; its height double its length.

The whole of this fish, including every part of the head, except the lips and maxillary, is covered with scales, which extend on to the vertical fins as in *Glyphisodon*: those on the fins and upper part of the head and snout are very small, but those on the gill-covers and body very large: about twenty-six or twenty-seven in a longitudinal line from the gill to the base of the caudal, and fourteen or fifteen in a vertical line: one taken from about the middle of the side is oblong, the breadth exceeding the length, with the anterior margin rounded, and the free portion finely dotted and very minutely ciliated, the concealed portion cut square, with a fan of eight or ten striæ not meeting at the centre, and terminating at the basal margin in as many crenations. The lateral line commences at one-fourth of the depth, but, from the fall of the dorsal line posteriorly, the distance between these two lines diminishes as the former advances: the lateral line terminates beneath the soft portion of the dorsal fin altogether.

Fins almost exactly similar to those of the *Glyphisodon saxatilis* and *Heliases insolatus*, as described and figured in the “Histoire des Poissons.” The fourth and fifth spines in the dorsal longest, equalling one-fourth of the depth; of the soft rays the third, fourth, and fifth are longest. First anal spine only one-third the length of the second, which is itself rather shorter than the soft rays; and these last appear longer than in the *H. insolatus*. Caudal more forked than crescent-shaped, the depth of the fork equalling nearly half the length of the fin, which is itself one-fourth the entire length of the fish. Axillary scales of the pectorals and ventrals as in *H. insolatus*.

B. 6; D. 13/12; A. 2/12; C. 15, & 4 short; P. 21; V. 1/5.

Length 8 inches.

COLOUR.—“Above lead-colour, beneath paler.”—D. In spirits, it appears of a deep brownish olive on the back and upper part of the sides, passing into dull golden yellow on the lower part of the sides and abdomen, where, however, the scales are still faintly edged with the former colour. Fins dark.

Habitat, Valparaiso, Chile.

This species, as M. Valenciennes observes, is so extremely similar to the *H. insolatus*, that at first sight, it would hardly be distinguished from it. The only differences appear to consist in the form of the caudal, which is forked, not crescent-shaped as in the species just mentioned, and in the greater length of



the soft rays of the anal. In the figure of *H. insolatus* in the "Histoire des Poissons," these rays are represented of the same length as the second spine, whereas in the present species they rather exceed it, giving a greater depth to the entire fin. The teeth also would seem to be more developed in the *H. Crusma*, especially those in front, which are longer than the others. According to Valenciennes, the outer row hardly exceeds the inner ones in the *H. insolatus*. The geographical position of the two species is however widely different. The *H. insolatus* is a native of the Caribbean Seas; whereas the *H. Crusma* has only been obtained on the coast of Chile and off the island of Juan Fernandez. M. Gay first obtained it at Valparaiso, where also Mr. Darwin's specimen was procured; in whose notes it is stated, that it gets to a much larger size than the one here described.

## FAMILY—SPARIDÆ.

## CHRYSOPHRYS TAURINA. Jen.

## PLATE XII.

*C. albida*, quatuor fasciis interruptis nigro-fuscis; pinnis dorsali, caudali, et ventralibus, clarè cæruleo-marginatis: dentibus anticis conicis, in maxillâ superiore octo, in inferiore decem minoribus; molaribus suprâ seriebus tribus, intermediâ minori, infrâ duâbus dispositis; preoperculo et operculo, utroque quatuor squamarum seriebus tecto; limbo preoperculi nudo.

D. 12/12; A. 3/10; C. 17, &c.; P. 15; V. 1/5.

LONG. unc. 14.

FORM.—General form not very dissimilar to that of the *C. Aurata*. Greatest depth contained about three times and a half in the entire length. Depth and length of the head equal, each about one-fourth of the entire length. Profile very oblique. Eyes high, and moderately large, distant two diameters from the end of the snout. Preopercle with the angle at bottom very much in advance, giving an obliquity to the ascending margin; the limb not very broad, and naked; in front of the limb are about four rows of scales smaller than those on the body: the same number of rows of scales on the opercle. Jaws equal, with eight conical incisors in front of the upper one, and ten in front of the lower; \* those above longer than those below, and more

\* There are actually nine, but one appears to have been lost.

regularly and closely set: behind the incisors above and below is a patch of fine card: then follow the molars, which are in three very regular rows above and two below; of the three rows above the inner and outer ones are much the strongest, containing each about eight teeth; those in the outer row are slightly pointed, and not very unequal in size, but the inner series enlarge very rapidly as they extend backwards, the last two or three being of considerable size; all round or nearly so, there being no large oval one at the back, as in the *C. Aurata* and some other species; the middle series above consists of teeth much smaller than the others, and more numerous: the two rows below are not very dissimilar to the inner and outer rows above. Suborbital broad, and naked, covering a large portion of the cheek.

Scales on the body of a moderate size; too much injured and displaced in this specimen to admit of the exact number being counted in a longitudinal row; those on the lateral line, however, are all perfect and present to within five rays of the end of the dorsal, and up to that point they amount to thirty-one. The fins, so far as can be judged from their present state, are on the whole very similar to those of the other species; but the dorsal and anal spines, especially the second anal spine, appear rather stronger than those of the *C. Aurata*. Pectorals long and narrow, contained about three times and three quarters in the entire length. COLOUR.—"White, with four dark brown much interrupted bands, giving a mottled appearance; head coloured with the same; top of the head, ridge of the back, edges of the dorsal, caudal and ventral fins, tinted with fine azure blue."—D.

Habitat, Chatham Island, Galapagos Archipelago.

Mr. Darwin's collection contains a single specimen of a species of *Chrysophris* from the Galapagos Archipelago, not in a sufficiently good state of preservation to admit of a very detailed description being given of it, but, nevertheless, evidently distinct from any that I can find recorded by authors. It appears to belong to Cuvier's second section of this genus characterized by the absence of any large oval molar behind the others, though the last two or three in the inner series above are of considerable size. It differs, however, from all those described in the "Histoire des Poissons," in having the conical incisors more numerous, and but three rows of molars in the upper jaw. The specimen also is of sufficient size to lead to the belief, that it would not have acquired any additional ones by further growth. The *C. aculeata* resembles it, indeed, in this last character, but independently of other differences, this species is said to have a reclined spine before the dorsal fin which is not present in the one here described.

Out of twenty-two species of this genus described in the "Histoire des Poissons," only one is from the Pacific Ocean, whence the present species was brought. The greater number are from the Atlantic and Indian Oceans.



## FAMILY—MÆNIDÆ.

1. GERRES GULA. *Cuv. et Val.?*

Gerres Gula, *Cuv. et Val.* Hist. des Poiss. tom. vi. p. 349.

FORM.—Greatest depth one-fourth of the entire length. Back but little elevated. Space between the eyes flat, with a fovea in the middle, which is prolonged in a channel nearly to the extremity of the snout. Length of the head exceeding its depth by one-fourth, and contained about three times and three quarters in the entire length. So much of the maxillary as is visible is of an oval form, its length being twice its breadth at its posterior extremity. Suborbital with the lower margin very indistinctly notched, and not denticulated. Eyes very large, their diameter contained twice and three quarters in the length of the head. The two orifices of the nostrils of nearly equal size. No denticulations on any of the pieces of the gill-cover. A narrow band of very minute velutine teeth in each jaw, those above hardly visible to the eye, but sensible to the touch: none on the vomer, palatines, or tongue.

Dorsal with the first spine extremely short; the second has a small piece broken off at the tip, but appears to have been about the same length as the third, which last equals two-thirds of the depth of the body; the fourth and fifth are a little shorter than the third; the succeeding ones gradually decreasing, as in the other species of this genus: all the spines are moderately slender, the anterior ones slightly arcuate, with scarcely any appreciable difference in the degree of stoutness in the first four. Anal with the first spine extremely short; the second obviously stouter than any of the dorsal spines, but much shorter, being only half the length of the second dorsal spine, or one-third the depth of the body; the third spine is a trifle longer than the second, but much slenderer. Caudal deeply forked; the lobes worn at the tips in this specimen, but their length, when perfect, probably about one-fourth, or somewhat less, of the entire length of the fish. Pectorals narrow and pointed, a little shorter than the head, and contained four and a half times in the entire length; fifth ray longest. Ventrals a little behind the pectorals, and not more than two-thirds their length, or scarcely so much; the spine a little shorter than the soft rays, and of about the same degree of stoutness as the dorsal spines. Elongated scale in the axillæ of the ventrals about three-fourths the length of the spine, of a narrow lanceolate form, ending in a very fine point.

D. 9/10; A. 3/7; C. 17, &c.; P. 14; V. 1/5.

Length 3 inc. 6 lines.

COLOUR.—Not noticed in the recent state. In spirits, it appears of a uniform silvery, with the back and upper part of the sides inclining to dusky olive: no bands or any particular markings: fins pale.

Habitat, Rio de Janeiro.

The species of this genus are numerous, and extremely similar to each other. Many of them appear to rest on characters taken simply from the relative lengths and degrees of stoutness of the dorsal and anal spines. This renders it extremely difficult to identify single specimens. Perhaps I am wrong in referring the one described above to the *G. Gula* of Cuvier and Valenciennes; but it makes so near an approach to that species, that I hardly dare characterize it as distinct. It cannot be the *G. Aprion* of those authors, which is closely allied to the *G. Gula*, and is found on the same coasts, since its teeth are so very much finer: the caudal also is not scaled. It is small, but Cuvier and Valenciennes state that none of their specimens of the *G. Gula* exceed five inches. Mr. Darwin took it in a salt-water lake, Lagoa de Boacica, at Rio de Janeiro.

2. GERRES OYENA. *Cuv. et Val.?*

Gerres Oyena, *Cuv. et Val.* Hist. des Poiss. tom. vi. p. 355.

Smaris Oyena, *Rüppell*, Atlas zu der Reise im Nörd. Afr. Zoologie; p. 11. tab. 3. fig. 2.

FORM.—Greatest depth contained rather more than three and a half times in the entire length: the dorsal curve very regular. Profile above the eyes a little concave. Length of the head exceeding its depth. Maxillary as in the species last described. Suborbital with its lower margin distinctly but not very deeply notched; not denticulated. Diameter of the eye less than one-third the length of the head. Posterior orifice of the nostrils twice the size of the anterior one. No denticulations on any part of the head or gill-cover. A narrow band of velutine teeth in each jaw, of about the same length and degree of fineness above and below; but none on the palate or tongue.

The dorsal commences in an exact vertical line with the insertion of the ventrals: the anterior spines are a little arcuate; the first, as in the other species of this genus, is extremely short; the second and third in this specimen are broken at their extremities so that their exact length cannot be ascertained, but the portion of the second remaining (and of this spine apparently only a very small piece is gone) nearly equals half the depth of the body; length of the fourth spine which is perfect not quite equalling two-fifths of the depth; fifth, sixth, and seventh spines gradually decreasing; eighth and ninth scarcely shorter than the seventh: the second spine is much compressed, and though obviously stronger than any of those which follow, not nearly so stout as in many other species; its breadth is not more than one-twelfth of its length. Anal commencing in a line with the fourth soft ray of the dorsal; the second spine compressed similarly to the second dorsal spine, and of about the same degree of stoutness, but its length one-third less, being just equal to one-third the depth of the body; the third spine scarcely shorter than the second, but much slenderer; the soft rays gradually decreasing from the first, which is a little shorter than the third spine, to the last but one, the last itself slightly prolonged



to form a point backwards. Caudal forked nearly to its base; the lobes much elongated; the upper one, which is a trifle longer than the lower, contained rather more than three times and a half in the entire length. Pectorals narrow and pointed, a little shorter than the head, and contained not quite four times and a half in the entire length; fifth and sixth rays longest. Ventrals attached a little behind the pectorals, and not much more than half their length; the spine about three-fourths the length of the soft rays, and scarcely stouter than the third spine in the anal: the axillary elongated scale three-fourths the length of the spine. The scales on the body of this species are not materially different from those of the *G. Plumieri* described in the "Histoire des Poissons."

B. 6; D. 9/10; A. 3/7; C. 17, &c.; P. 16; V. 1/5.

Length 7 inches.

COLOUR.—"White, silvery."—D. The fins are yellowish; the membranes here and there dotted with black: the lobes of the caudal are bordered internally with dusky. I see no trace of the interrupted longitudinal bands spoken of by Cuvier and Valenciennes, neither is there any allusion to them in Mr. Darwin's notes taken from the recent fish.

Habitat, Keeling Island, Indian Ocean.

I do not feel confident as to this species being, any more than the last, identical with that to which I have referred it. It requires an inspection of a large number of specimens in order to ascertain the true value of characters. The present one agrees with what is stated of the *G. Oyena* by Cuvier and Valenciennes, excepting that the second anal spine, which they represent as shorter than the second dorsal spine by one-half, is here shorter by one-third only: also, as mentioned above, there is no appearance of any longitudinal bands. There is no other species in the "Histoire des Poissons," to which it approaches more closely. But comparing it with Rüppell's figure, if this last be scrupulously exact, there are a few other differences besides those already alluded to. Thus the first anal spine in Mr. Darwin's specimen appears shorter in relation to the second, and this last stouter as well as longer. Also the soft rays of this fin gradually decrease, giving a sloping direction to the margin, whereas in Rüppell's figure, all the rays are nearly of the same length, and made equal to the second and third spines. The caudal lobes, likewise, appear longer in Mr. Darwin's specimen. It must be left for others to determine whether these discrepancies are indicative of a specific difference or not. As regards the geographic range of the *G. Oyena*, I know not that there is any thing in this respect to render its identity with the species here described improbable. It inhabits the Red Sea; and is also said to be common at the Mauritius;—whence it may very possibly

extend as far eastward as the Keeling Islands, where Mr. Darwin's specimen was obtained.

The *Sparus erythrurus* of Bloch (pl. 261) is so extremely unlike the present species both in form and colours, that, except on the authority of MM. Cuvier and Valenciennes, who state that they had seen Bloch's original specimen, no one could have suspected that the figure had been intended for it.

#### FAMILY—CHÆTODONTIDÆ.

##### CHÆTODON SETIFER. *Bloch.*

Chatodon setifer, *Bloch*, Ichth. pl. 425. fig. 1.  
 ———— *Cuv. et Val.* Hist. des Poiss. tom. vii. p. 58.

FORM.—This species is one of those characterized by a prolongation of a portion of the soft dorsal fin. In the present specimen it is the sixth soft ray which is thus prolonged. The total length of this ray, measured from the root, is half the entire length of the fish; and that portion of it which exceeds the adjoining rays is rather more than half. Although the preopercle can hardly be called denticulated, yet there are some faint traces of rudimentary denticulations at the lower angle. The general form, in all other respects, agrees with the descriptions of Cuvier and other authors.

D. 13/24; A. 3/21; C. 17, and 6 short; P. 16, the first short; V. 1/5.

Length 6 inc. 3 lines.

COLOUR.—"Body pale, with narrow dark straight lines which form network: across the eye a black band: posterior half of the body bright orange: upper part of the prolongation of the dorsal fin edged with black, and a round patch of the same."—D. The black ocellus extends from the fifth to the thirteenth ray of the soft dorsal. There is no trace of the four red or yellow streaks said by Cuvier and Valenciennes to cross the forehead from eye to eye; but probably they are effaced by the action of the spirit.

A second specimen only differs from the above in being smaller, measuring in length not quite five inches; in having the fifth (instead of sixth) ray in the soft dorsal prolonged; and in the ocellus extending from the fifth to the tenth ray only. In the last two respects it agrees better with the description in the 'Histoire des Poissons.' The filamentous ray terminates in an extremely fine hair, which leads me to think that the extreme portion of this ray in the first specimen has been broken off.

Habitat, Keeling Island, Indian Ocean.



Mr. Darwin's collection contains two individuals of this species procured on coral reefs at the Keeling Islands. As according to his notes made from the recent fish, the posterior half of the body is bright orange, Bloch's figure may not be so much overcoloured as is supposed by Cuvier and Valenciennes, who state that he has represented of a bright red, what ought to be silvery grey and yellow ochre. Perhaps the colours may depend in some measure on the season. Mr. Darwin's specimens were obtained in the month of April.

GENUS—STEGASTES.\* *Jen.*

*Corpus oblongo-ovale, compressum. Caput obtusum. Os parvum, haud protractile. Dentes maxillares omnes incisores, parvi, æquales, contigui, uniseriati; palatini velutini, minuti. Ossa suborbitalia denticulata. Preoperculum margine adscendenti levissimè denticulato. Operculum inerme. Membrana branchialis quatuor-radiata. Pinnæ verticales squamis confertis ferè omnino obtectæ: dorsalis unica, subæqualis, membranâ ad apices spinarum parum laciniatâ: ventrales radio primo molli elongato. Linea lateralis sub terminationem dorsalis interrupta. Squamæ rostri et verticis parvæ; operculi et corporis magnæ, obliquè dispositæ; omnes levissimè ciliatæ.*

This apparently new form will enter into none of the genera established by Cuvier and Valenciennes. The palatine teeth serve to detach it from the *Sciænidae*, while this character, taken in connexion with the compressed body, and the extreme scaliness of the vertical fins, require that it should be arranged with the *Chatodontidae*, or at least have a place in that large group to which Cuvier has given the name of *Squamipennes*. It belongs to the second tribe in that family characterized by cutting teeth; and it would seem most nearly allied to *Pimblepterus*, but it does not approach that genus very closely, and may at once be distinguished from it, by the teeth being without spurs behind, and the dorsal and anal fins being more scaly. From *Dipterodon*, the only other genus in that tribe, it may be known by its undivided dorsal, independently of other marked differences.

But though this genus requires to be arranged with the *Chatodontidae* on the grounds above mentioned, in all its other characters it comes much nearer that portion of the *Sciænidae* which have the lateral line terminating beneath the end of the dorsal fin; especially *Pomacentrus*, which it resembles in the general form

\* *Στεγαστης*, tector.

of the head and body, denticulated suborbital and preopercle, unarmed opercle, four-rayed branchiostegous membrane, and in the size and mode of arrangement of the scales on the body. I am not aware that any species of *Pomacentrus* have the dorsal and anal fins so completely covered with scales: but, according to Cuvier and Valenciennes, there is a species of *Glyphisodon*,\* to which genus *Pomacentrus* is closely allied, which has these fins almost as entirely scaled, as in the true *Squamipinnati*; and if so, there is nothing but the palatine teeth which of necessity demands the separation of this new genus from the *Sciænidae*. These teeth can be distinctly felt upon the vomer, but I am not quite sure from the small size of the fish, and its mouth also being small, whether they exist on the palatines as well. It may be added that this genus shews further itself an affinity to *Glyphisodon*, in the filamentous prolongation of the first soft ray in the ventrals. This character is not, I believe, found in *Pomacentrus*.

In which ever family it is placed, it forms a beautiful connecting link between the two. It is from the Cape Verde Islands.

STEGASTES IMBRICATUS. *Jen.*

PLATE IX. fig. 2.

FORM.—Oblong-oval; the body much compressed. Greatest depth rather more than one-third of the entire length: head one-fourth of the same. Snout short and obtuse; the profile rising very obliquely, and forming with the dorsal line one continuous curve. The back is sharp, and appears more elevated than it really is, in consequence of the dorsal fin being thickly coated with scales, and scarcely distinguishable from the body. Ventral line less convex than the dorsal; the edge of the abdomen somewhat carinated between the ventral and anal fins, but in advance of the former rounded. The upper and under profile meet at the mouth at a right angle. Mouth small, and scarcely at all protractile. Jaws equal; each with a single row of cutting teeth, which are small, though rather larger below than above, even and closely set, forming a compact series: no secondary teeth behind: vomer rough with minute velutine teeth. When the mouth is closed, no portion of the maxillary is concealed by the suborbital. Eyes round, moderately large, their diameter rather less than one-third the length of the head, placed high in the cheeks, and nearer the end of the snout than the posterior angle of the opercle, the distance from the former being rather less than one diameter. The nostrils consist of a single minute round aperture, about half-way between the eye and the anterior margin of the suborbital. The suborbital has its margin entire as far as the end of the maxillary, at which point it curves backwards and upwards to form a narrow band beneath the eye, and the lower margin of this band is denticulated. The preopercle is likewise denticulated; but the denticulations, which are principally confined to the ascending margin, are not very obvious, and more

\* *G. chrysurus*, Cuv. et Val.



readily felt than seen: the angle at bottom is rounded, and rather exceeds a right angle; a vertical from the angle would form a tangent to the posterior edge of the orbit: the ascending margin is not quite straight, bending slightly inwards a little below the middle. The opercle terminates posteriorly in a very obtuse angle, and shows some indication of two very minute flattened points, which, however, do not project beyond the membrane: from the lowermost of these points the margin of the subopercle passes obliquely forwards to form a continuous curve with that of the interopercle, which is tolerably well developed. Gill-opening of moderate size: the branchial membrane, which apparently has only four rays, has a shallow notch in front, and passes continuously from one side to the other, without being attached to the isthmus.

The lateral line commences at the upper angle of the opercle, and, inclining upwards, runs parallel, not to the dorsal line which can hardly be distinguished, but to the upper edge of the dorsal fin, its distance from which is contained about three times and a half in the entire depth; it terminates a little before the termination of that fin. Cranium, snout, cheeks, pieces of the opercle, the body, and all the vertical fins, covered with finely ciliated scales; those on the crown and snout small, but those on the opercle and body large; the latter arranged in oblique rows; about twenty-seven in a longitudinal line from the gill to the caudal, and about fourteen in a vertical one from the dorsal to the ventral line: a scale taken from the row beneath the lateral line, and about the middle of the body, is of an oblong form, its breadth exceeding its length, with the free edge dotted and finely ciliated, the basal margin rather deeply crenated, the crenations separated by seven striæ, which are carried on for only a short way, and do not converge to a fan. The scales on the dorsal and anal fins are small and closely compacted; those on the former arranged obliquely, but the line of obliquity is in the opposite direction to what it is on the body.

The dorsal fin commences in a line with the posterior angle of the opercle, and occupies a space equalling half the entire length: the height of the spinous portion is nearly uniform, but slightly increases backwards; between the tips of the spines, the membrane is a little jagged: the soft portion is scarcely more than one-third the spinous in length, but is somewhat higher, terminating upwards in an acute angle; the longest of the soft rays is about half the depth of the body, the dorsal fin itself not included. The anal answers to the soft portion of the dorsal, which it exactly resembles; it has two spines in front, the first of which is very short, and scarcely more than one-third the length of the second, which itself is shorter than the soft rays; the second spine is stouter than any of the dorsal spines. These two fins terminate in the same vertical line. The caudal appears to have been square, but the rays are worn at the tips, so that its exact form cannot be ascertained; it is coated with scales for four-fifths of its length from the base. Between the dorsal and the caudal fins is a space equalling not quite one-third the depth of the body. Pectorals attached a little behind the opercle, and a little below the middle; slightly pointed; about the length of the head or rather shorter; the first ray only half the length of the second; fourth and fifth longest; all the rays, with the exception of the first two and the last two or three, branched. Ventrals attached a little further back than the pectorals; the first soft ray prolonged into a filament reaching to the commencement of the anal; the spine is about half the length of the filamentous ray, and about two-thirds that of the second soft ray. Between these fins is an oval lanceolate scale about one-third their length; and in their axillæ another elongated one, narrower and more pointed than the former, and rather exceeding it in length.

B. 4; D. 12/16; A. 2/12; C. 15, and 4 short; P. 21; V. 1/5.

Length 3 inches.

COLOUR.—Not noticed in the recent state. *In spirits*, the whole fish, fins included, appears of a uniform dark brown.

Habitat, Porto Praya, Cape Verde Islands.

The only specimen of this new genus which exists in the collection was taken by Mr. Darwin off Quail Island, in the bay of Porto Praya. It is small, but probably full-sized, or nearly so; since the greater part of the species of *Pomacentrus*, to which genus it is so strongly allied, average about the same dimensions. Possibly some of the generic characters, which I have given above, may prove hereafter to be merely specific; but till other species shall have been discovered, their exact value cannot be ascertained.

#### FAMILY.—SCOMBRIDÆ.

GENUS—PAROPSIS. *Jen.*

*Corpus altum, rhomboideum, valdè compressum, squamis minutissimis obtectum. Linea lateralis anticè sursum paulò arcuata, per totam longitudinem inermis. Cauda lateribus haud carinatis. Dentes in utràque maxillâ uniseriati, tenuissimi, acuti; in linguâ, vomere, et palatinis, velutini brevissimi. Apertura branchialis amplissima, membranâ decem-radiatâ. Spinæ quinque liberæ loco pinnæ dorsalis primæ; spinâ minutâ præeunte reclinatâ antrorsum flexâ. Dorsalis secunda, æquè ac analis, continua, sine pinnulis falsis: ante analem spinæ duæ liberæ. Pectorales parvæ. Ventrals nullæ. Caudalis profundè furcata, lobis acuminatis, subelongatis.*

This new genus belongs to that section of the *Scombridæ* characterized by having a number of short free spines, instead of a first dorsal fin. It is most nearly allied to *Lichia*, especially to the *L. glaucus*, which it resembles in general form, as well as in many of its particular characters. It has the same reclined spine in front of those which represent the first dorsal, and the same two free spines in front of the anal; also the same form of opercle; the same deeply-forked caudal, and small pectorals. But it may be at once distinguished from that genus by the absence of ventrals, of which there is not the least trace: the body is also deeper, rhomboidal rather than oval, and more compressed. In all these respects it agrees better with *Stromateus*, which would seem particularly to meet it in those species, such as the *S. candidus* and *S. securifer*, which are represented by Cuvier and Valenciennes as having a number of minute truncated

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spines before the dorsal and anal fins, and which, by virtue of this character, though in the case of the former the spines are not apparent externally, serve manifestly to re-conduct to the section to which *Lichia* belongs. The discovery of the present genus, therefore, furnishes a more completely connecting link between these two groups.

*Rhynchobdella* and *Mastacemblus* agree with *Paropsis*, both in wanting ventrals and in having the first dorsal represented by free spines; but the form of these two genera is so totally different in all other respects, that it is impossible they can be confounded with it.

This new genus is from the east coast of South America.

PAROPSIS SIGNATA. *Jen.*

PLATE XIII.

*P. argentea, nitens, summo dorso cærulescente; operculo ad angulum superiorem maculâ nigrâ signato; pinnis pectoralibus maculis duabus in axillis et ad radices radiorum, minoribus.*

B. 10; D. 5—1/33; A. 2—1/35; C. 17, et circa ½ accessar.; P. 21; V. 0.

LONG. unc. 9.

FORM.—Body very much compressed, of a rhomboidal form, the dorsal and ventral lines rising to an angle at the commencement of the dorsal and anal fins respectively. Head a laterally compressed cone: tail becoming suddenly attenuated before the setting on of the caudal fin, without any keel at the sides. Back sharp and elevated; the greatest depth contained not more than two and a half times in the entire length: thickness only one-fifth of the depth. The length and depth of the head are equal, each being half the depth of the body. The upper and under profile meet at the extremity of the snout at nearly a right angle, the former falling in a very regular curve from the commencement of the dorsal fin. Mouth moderately large, the commissure reaching to beneath the eye, with the lower jaw projecting and of considerable strength and thickness. In each jaw a single row of very fine sharp teeth. The tongue, which is of a triangular form, free at the tip, and pointed, is rough, with some extremely fine closely shorn velutine teeth: a small triangular patch of these last teeth on the front of the vomer, and a narrow row on each palatine: pharyngeans with rather stronger teeth. The intermaxillary is very slightly protractile. The maxillary reaches, when the mouth is closed, to a vertical from the posterior part of the orbit: it is very visible from without, having only its anterior portion concealed by the suborbital, and being much dilated at its posterior extremity, which is in shape somewhat securiform. Eyes above the middle of the cheek, and nearer the end of the snout than the posterior margin of the opercle; their diameter rather more than one-fifth the length of the head: the suborbital forms a narrow band beneath each. Nostrils half-way between the eyes and the end of the snout; the anterior orifice round; the posterior, which is the larger one, oval. Preopercle with the ascending margin nearly vertical; the angle at bottom rounded. The opercle and subopercle together present a rounded margin posteriorly,

though at the upper portion there are two small blunt points distinguishable by the finger, between which there is a very shallow notch: the line of separation between these two bones descends obliquely forwards to a little above the rounded angle of the preopercle, where it meets the line of the interopercle, which descends obliquely backwards:\* all the margins of the opercular pieces entire. Gill opening very large, the aperture reaching to beneath the anterior margin of the eye: the membranes, each of which has as many as ten rays,† cross a little over each other, and are not united to the isthmus.

Snout, jaws, and cheeks, as well as the several pieces of the gill-cover, without scales:‡ body covered with extremely minute ones, of an oval form, longer than broad, marked with concentric circles, and entire on the margin. The lateral line is slightly arched above the pectoral, and its course a little undulating, but it descends gradually to near the middle of the body, whence it runs straight to the caudal.

The first dorsal is represented by five short free spines, each capable of separate motion, and each furnished with its own membrane; in advance of them is a somewhat smaller reclined spine with its point directed forwards: the first erect spine is above the middle of the pectoral, and distant from the end of the snout nearly one-third of the entire length. Beyond the five free spines, and immediately before the commencement of the second dorsal is another small spine closely pressed down, and almost concealed beneath the skin, pointing backwards. The second dorsal, which has also at its anterior edge a small spine one-third the length of the first soft ray, commences at the middle point of the entire length, caudal excluded. The general form of this fin is similar to that of the genus *Lichia*, long, with the anterior portion elevated; the greatest height about one-fourth of the depth, or hardly so much. The anal answers exactly to the second dorsal in form and extent, and is preceded by two free spines, separated from it by a small space, besides a longer one at its anterior edge. Caudal forked nearly to the base, where there are a number of minute scales; the lobes equal, pointed, and moderately elongated, each contained about four times and one-third in the entire length. Pectorals attached at about the middle of the depth, a little behind the opercle; of a somewhat triangular form, small, their length not much exceeding half that of the head. No trace of ventrals whatever.

COLOUR.—“Uniform bright silvery, the ridge of the back bluish: a black patch on the gill-cover, and another under the pectoral fin.”—D.—The first of the patches alluded to by Mr. Darwin is very conspicuous, and is situate at the upper angle of the opercle, immediately in advance of the commencement of the lateral line. The second may be described as consisting of two distinct spots; one at the root of the upper rays, and completely in the axilla; the other, a small one of an elongated form, immediately beneath the lowest ray, and partly visible without raising the fin. The elevated portion of the second dorsal is also dusky, and a faint edging of this colour runs for a short way along the margin of this fin. The anal is pale.

Habitat, Northern coast of Patagonia.

\* This part is exactly as described by Cuvier and Valenciennes in the *Lichia Amia*, to which genus the present one is so nearly allied.

† *Lichia Amia* is represented as having nine; and this forms another mark of affinity between the two genera.

‡ There are scales on the cheeks in *Lichia*, according to Cuvier and Valenciennes, but I see no appearance of them in this genus.



I have termed this species *signata*, in reference to the black patch on the opercle, which is a conspicuous character. The only specimen in the collection was obtained by Mr. Darwin at Bahia Blanca, on the coast of North Patagonia.

1. *CARANX DECLIVIS*. *Jen.*

PLATE XIV.

*C. corpore elongato, altitudine quintam, capite quartam partem longitudinis æquante; maxillâ inferiore longiore; lined laterali infra quintum radium dorsalis secundæ subito declivi, per totam longitudinem armatâ, laminis 32 altioribus quam longis, ubique æqualibus; spinâ reclinatâ ante pinnam dorsalem parvâ, mucrone tamen nudato; pectoralibus ultra pinnulam analem, et prope ad analem ipsam, pertinentibus.*

B. 7; D. 8—1/35; A. 2—1/30; C. 17, &amp;c.; P. 21; V. 1/5.

LONG. unc. 7. lin. 10.

FORM.—Rather more elongated than the *C. trachurus* of the British seas. Greatest depth one-fifth of the entire length: head one-fourth of the same: thickness about half the depth. Diameter of the eyes a little less than one-third the length of the head. Lateral line bending downwards more suddenly, and at a more backward point than in that species. The bend commences in a line with the fifth ray of the second dorsal, and is entirely comprised within a space equal to that occupied by four fin rays,\* so that opposite the ninth ray it again advances in a horizontal line. The posterior portion about equals in length the anterior, the bend being included in this last. The laminae which protect the lateral line, and which extend throughout its whole length, are well developed, and everywhere of the same breadth; this breadth equalling nearly, but not quite, one-third the depth of the body. In number they are eighty-one or eighty-two; of which the last thirty-eight or forty, forming the posterior portion of the line, have keels terminating backwards in sharp spines: these spines are at first small and inconspicuous, but gradually increase in size as they advance towards the thinnest part of the tail, where they are sharpest and most developed.

In most of its other characters this species so closely resembles the *C. trachurus*, as to render a detailed description unnecessary. The reclined spine before the first dorsal, however, is smaller, though the point is sharp and exposed: also the number of rays in the second dorsal and anal is greater by five in each fin. The length of the second dorsal is two-and-a-half times that of the first. The pectorals are long, narrow, and pointed; a little shorter than the head, or rather less than one-fourth of the entire length; when laid back, they reach beyond the anal finlet, and very nearly to the commencement of the true anal itself.

COLOUR.—Not noticed in the recent state. So far as can be judged from a specimen in spirits, the colours appear to have been similar to those of the *C. trachurus*; and there is the same black spot on the upper part of the opercle.

\* In the *C. trachurus*, the bend begins in a line with the commencement of the second dorsal, and from its more gradual obliquity, extends over a space equal to that occupied by nine fin-rays.

Habitat, King George's Sound, New Holland.

Cuvier and Valenciennes have noticed several variations of form occurring in different specimens of the *C. trachurus*, from different seas, which they have not ventured to raise to the rank of species. That the one here described is entitled, however, to this distinction, I can hardly entertain a doubt. The suddenness of the bend in the lateral line, and the more backward point at which the bend commences; the larger number of laminae which protect it; and also the larger number of rays in the second dorsal and anal; all seem to indicate a specific difference. Whether it be identical with any of the varieties noticed by them is uncertain; but it seems to be distinct from the only one they speak of as having been received from New Holland, in which the number of laminae did not exceed seventy-three. I have called it *declivis*, in reference to the character of the lateral line above alluded to. It was obtained by Mr. Darwin in Princess Royal Harbour, in King George's Sound.

2. *CARANX TORVUS*. *Jen.*

PLATE XV.

*C. corpore crassiusculo, subelongato; altitudine viâ quartam partem longitudinis æquante, capite quartam superante; maxillâ inferiore longiori; oculis magnis; suborbitalibus venis nonnullis subparallelis obscuris notatis; lined laterali parum deflexâ, anticè squamis parvis inermibus, posticè laminis carinatis 35 vel 36 tectâ; spinâ reclinatâ ante pinnam dorsalem sub cute occultâ; pectoralibus longis, falcatis, ad initium pinnae analis prope pertingentibus.*

D. 8—1/26; A. 2—1/22; C. 17, &amp;c.; P. 21; V. 1/5.

LONG. unc. 11. lin. 9.

FORM.—Thicker and deeper in the body than the *C. trachurus*. The greatest depth a little less than one-fourth of the entire length; the thickness exceeding (but by a very little) half the depth. Head large; its length a little more than one-fourth of the entire length; its height or depth, taken in a line forming a tangent to the posterior part of the orbit, less than its own length by two-sevenths. Eyes large; their diameter very nearly one-third the length of the head; partially covered at the sides by two fatty membranous veils, as in several other species. The ventral line of the body is rather more curved than the dorsal, and the upper profile in like manner a little more approaching to rectilineal than the lower. The lower jaw a little the longer, and ascending to meet the upper. Maxillary reaching not quite to beneath the middle of the eye; its extremity truncated in the form of an arc, with the curvature inwards. In each jaw a single row of very fine, minute, closely set teeth; two small patches on the anterior extremity of the vomer, a band on each palatine, and one on the tongue, all closely shorn velutine. Suborbital, on each side of the extremity of the snout, marked with several nearly parallel dark-coloured veins. Preopercle with the angle very much rounded; the limb broad,



slightly striated or veined, and not separated from the cheek by any salient ridge. The other pieces of the gill-cover taken together are bounded posteriorly by a sinuous and very irregular margin, the notch in the bone at the upper part of the opercle being nearly semicircular, beneath which is an obtuse point, whence the obliquely descending margin first slopes slightly inwards, then passes outwards to form another blunt point lower down, then slopes inwards again. The course taken by the margin of the membrane in some measure follows that of the bone, but the sinuosities and salient angles are more rounded. Cheeks and opercle scaly, as well as the cranium and forehead between the eyes.

The lateral line does not deviate very much from rectilineal. The deflection, such as it is, may be said to commence in a line with the termination of the first dorsal, and to end beneath the first third of the second dorsal. Up to this point, the scales which cover it are small and round; but they then begin gradually to enlarge, and to assume a keel terminating posteriorly in a short spine: these scaly laminae continue increasing in size till they arrive beneath the last quarter of the fin, where they are most developed; none of them, however, are very large, and even here they do not extend over the whole breadth of this part of the tail, nor their own breadth exceed one-eighth of the greatest depth of the body. After passing the dorsal and anal fins, they rapidly diminish as they approach the caudal. The entire number of laminae may be set at thirty-five or thirty-six; but as it is difficult to fix the exact point where they commence, it will vary according as the computation is made more or less in advance. The anterior portion of the lateral line, bend included, is a little longer than the posterior.

The reclined spine in this species is entirely concealed beneath the skin. The pectorals are long and falcate, terminating in a sharp point: their length nearly equals that of the head, or about one-fourth of the entire length: when laid back, they reach over the anal finlet, and very nearly to the commencement of the true anal. The ventrals are attached a little behind the pectorals, and are only half as long. The other fins are much as in the other species of this genus. The height of the anterior part of the first dorsal equals exactly half the depth. The lobes of the caudal are one-fifth of the entire length.

COLOUR.—Not noticed in the recent state. *In spirits*; silvery on the abdomen and lower half of the sides, passing above the middle, and on the back, into pale lead blue, tinged with gray and brownish: fins pale greyish brown. No conspicuous markings, except the usual spot on the notch of the opercle, which, however, is small, and confined entirely to the membrane.

Habitat, Tahiti.

This species belongs to the second section adopted by Cuvier and Valenciennes in this genus; or that in which the form of the body resembles that of the *C. trachurus*, but in which the laminae on the lateral line only extend over the posterior portion, the anterior being smooth and simply covered with small scales. But it will not exactly accord with any of the species described by those authors. It seems to approach most nearly the *C. Plumieri*; but though the eyes are of considerable size, they are not quite so large as they are represented to be in that. There seem, in fact, to be several species characterized by large eyes. Spix and Agassiz have figured one from America under the name of *C. macrophthalmus*; and under the same name Ruppell has figured another from the Red Sea. Both

these, however, appear likewise different from the one here described, at the same time that their different geographic range renders their identity *à priori* improbable. The present one was taken by Mr. Darwin at Tahiti.

### 3. CARANX GEORGIANUS. *Cuv. et Val.*

*Caranx Georgianus*, *Cuv. et Val.* Hist. des Poiss. tom. ix. p. 64.

FORM.—Of an oval compressed form, with the back elevated. Greatest depth one-third of the entire length, caudal excluded: thickness not half the depth: head one-fourth of the entire length, caudal included. Profile ascending obliquely, and in nearly a straight line, to meet the dorsal curve. Upper jaw a little the longer. The maxillary, which is truncated and cut nearly square at its posterior extremity, not quite reaches to beneath the anterior margin of the orbit. In each jaw a row of about thirty-five teeth, which are small, somewhat cylindrical, set regularly, nearly equal, and rather blunt at the point; very little trace of any secondary row, simply four or six smaller ones behind those in the middle of the upper jaw, and perhaps in the lower also, but they are not very obvious. A triangular patch of velutine teeth on the vomer, and a narrow band of the same on each palatine; also on the tongue: these last, however, very closely shorn. Eyes a little above the middle of the cheek, but exactly half-way between the end of the snout and the posterior margin of the opercle; their diameter one-fourth the length of the head. Preopercle rounded at the angle; its limb separated from the cheek by a slight but not very salient ridge. Opercle with the notch at the upper part not very deep; the obliquely descending margin straight.

The lateral line follows the curvature of the back until it arrives beneath the middle of the second dorsal, at which point it becomes straight, and the scales gradually pass into carinated spinous laminae. These laminae, however, are very little developed anteriorly to the last quarter of that fin; and even beneath the end of it, where they are largest, they do not extend over more than half the breadth of the tail, nor does their own breadth exceed one-seventeenth of the greatest depth of the body. The number of them is from twenty to twenty-five, according to the point at which the reckoning commences, the transition from the scales to the laminae being very gradual. The pectorals are falcate and sharp-pointed, and one-fourth of the entire length, caudal included. The height of the anterior part of the dorsal is contained two and a half times in the depth. The lobes of the caudal are contained four times and three-quarters in the entire length.

D. 8—1/27; A. 2—1/24; C. 17, &c.; P. 20; V. 1/5.

Length 7 inches 6 lines.

COLOUR.—Not noticed in the recent state. The colour of the back and upper part of the sides appears to have been bluish grey, with steel and other reflections, and was probably very brilliant in the living fish: belly silvery. No markings, except a conspicuous black spot on the upper part of the opercle.

A second specimen.—Differs in no respect from the above, excepting in having one ray less in the second dorsal and anal fins.

Habitat, King George's Sound, New Holland.

I entertain not the least doubt of this species being the *C. Georgianus* of



Cuvier and Valenciennes; but as the notice of it in the "Histoire des Poissons" is extremely brief, I have deemed it advisable to annex a detailed description. Both Mr. Darwin's specimens are from King George's Sound, where the species was first discovered by MM. Quoy and Gaimard.

*SERIOLA BIPINNULATA. Quoy et Gaim.*

*Seriola bipinnulata, Quoy et Gaim. Voyage de l'Uranie (Zool.) p. 363, pl. 61. f. 3.*  
*Cuv. Regne An. (2d Edit.) tom. ii. p. 206.*

**FORM.**—Elongated, and fusiform. Greatest depth contained four times and a half in the length, measuring this last to the base of the caudal fork. Head four times and a quarter in the same: depth of the head not quite once and three-quarters in its own length; the cheeks nearly vertical. Snout pointed: profile straight, and but slightly falling. Lower jaw a little longer than the upper, the commissure reaching to beneath the orifices of the nostrils: maxillary very conspicuous, and greatly dilated at its posterior extremity. A band of minute velutine teeth in each jaw, broadest in front; a disk of similar teeth on the vomer, and a band on each palatine. Eyes large; their diameter one-fifth the length of the head; situated a little above the middle of the cheek, and a little nearer the end of the snout than the posterior margin of the opercle; exactly two diameters between the eye and the end of the lower jaw. The nostrils consist of two small, round, closely approximating orifices, the anterior one partially covered by a membrane; situated rather nearer the eye than the extremity of the snout. Preopercle with the ascending margin vertical, and the angle at bottom rounded; the limb very broad, and marked with veins, and between the veins, along the basal margin, with fine striæ. The rest of the pieces of the gill-cover, taken together, present a rounded and regularly curved outline posteriorly; the line of separation between the opercle and subopercle ascends obliquely backwards from a point about two-thirds down the posterior margin of the preopercle; that between the subopercle and the interopercle (which last is well developed) passes downwards and backwards, forming an angle of about 45° with the axis of the body. Branchial aperture large; the membrane deeply cleft. Snout, jaws, and pieces of the opercle, smooth and naked; cheeks scaly, the scales on the upper part of the cheek, between the eye and the upper angle of the preopercle, being of a narrow pointed form. The scales on the body are of a moderate size, oval, marked with fine concentric circular striæ, with a fan of coarser diverging striæ on their concealed portion. The lateral line is smooth throughout its length, and runs nearly straight from the upper angle of the opercle to the caudal, its course being a little above the middle.

The first dorsal commences at about one-third of the entire length, measuring this last as before: it is low and inconspicuous, consisting of only six weak spines, of which the third and fourth are somewhat the longest, but whose length is less than one-fifth of the depth of the body. The length of the fin itself is rather less than half the depth. Second dorsal closely following, and much longer; of the form usual in this family, with the anterior portion elevated and somewhat triangular, but beyond the ninth ray low and even: its spine half the length of the first soft ray: its greatest elevation contained about two and a-half times in the depth. The last two rays of this fin are broke away from the rest, with an intervening space, to form a spurious finlet, and are rather longer, the last especially, than those which precede. The anal com-

mences opposite the fourteenth ray of the second dorsal, and is similar in form to that fin, but of course shorter, and also less elevated at its anterior extremity: finlet and the intervening space exactly corresponding. Caudal deeply forked; the lobes very long and pointed, each equalling nearly one-fourth of the entire length; the middle rays not one-fourth the length of the lateral ones. Pectorals attached a little below the middle; in length a little exceeding half that of the head. Ventrals about the same size as the pectorals, but attached a little further back. A slight elevation at the sides of the tail, but no distinct keel, properly so called.

D. 6—1/24—I; A. 1/16—I; C. 17, &c.; P. 20; V. 1/5.

Length 18 inc. 3 lines.

**COLOUR.**—"Band on the side azure blue; above a duller greenish blue; beneath two greenish metallic stripes: lower half of the body snow white."—D. No trace of the longitudinal stripes remains in the dried skin.

**Habitat,** Keeling Island, Indian Ocean.

A tolerably exact figure of this species occurs in the Zoological Atlas of Freycinet's Voyage, but I can find no notice of it in the "Histoire des Poissons" of Cuvier and Valenciennes. Although referred by Cuvier in his "Regne Animal" to *Seriola*, it rather departs from that genus in some of its characters. Independently of the spurious finlets in the dorsal and anal fins, which separate it from all the other species, I see no trace of any reclined spine before the first dorsal, nor of two free spines before the anal; in both which respects *Seriola* is said to resemble *Lichia*. Possibly, however, as Mr. Darwin's specimen is a dried skin, these characters may have been destroyed in the process of preparation. And to the same cause, perhaps, is to be attributed the circumstance of my not being able to observe more than one spine in the true anal, Quoy and Gaimard mentioning two. On the other hand, these naturalists appear to have overlooked the narrow pointed scales on the upper part of the cheeks, which are of a different character from the scales on the body.

Mr. Darwin's specimen of this species was obtained at the Keeling Islands. The one figured in Freycinet's Voyage was procured at Papua or New Guinea. It probably, therefore, has a considerable range over the Indian Ocean.

*PSENES — ?*

*Psenes leucurus, Cuv. et Val. ? Hist. des Poiss. tom. ix. p. 197.*

Mr. Darwin's collection contains two individuals of a species of *Psenes*, in reference to which his notes state that they were taken in Lat. 17° 12' S., Long. 36° 33' W., a hundred and twenty miles from the nearest land above water, though shoals were considerably nearer. They do not measure more than one inch eight lines in length; and from their small size, and their not being in a very

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firm state of preservation, it is hardly possible to say whether they are new or not. In form, they differ but little from the *P. cyanophrys* of Cuvier and Valenciennes: still they are evidently not that species, and one point of difference consists in the lateral line, which terminates beneath the end of the second dorsal, and is not carried on to the caudal, as represented in the figure of the above species in the "Histoire des Poissons:" the eye too appears rather larger; the forehead is hardly so much elevated, and the pectorals are shorter than the head. Perhaps it may be the *P. leucurus* of the above authors; though this species is from the Indian seas, so that its range must be considerable if the same. The description of the *P. leucurus* in the "Histoire des Poissons" is too short to determine this point. It is said to have been so named on account of its whitish tail, all the other fins being black. In the present species, the fins are likewise black, or at least dusky, except the caudal, which Mr. Darwin's notes, taken from the recent fish, state to have had "a pink tinge." In the same notes it is added,—"belly silvery white mottled with brownish black; sides bluish with dusky greenish markings; iris yellow, with dark blue pupil." The fin-ray formula is as follows:

D. 10—1/27; A. 3/27; C. 17, &c.; P. 17 or 18; V. 1/5.

Though these specimens are small, they have the appearance of being nearly full-sized. Cuvier and Valenciennes state that their specimens of the *P. leucurus* do not exceed two inches in length.

STROMATEUS MACULATUS. *Cuv. et Val.?*

*Stromateus maculatus*, *Cuv. et Val.* Hist. des Poiss. tom. ix. p. 296.

FORM.—General form so extremely similar to that of the *S. Fiatola* of the Mediterranean as to preclude the necessity of a detailed description. Greatest depth one-third of the length: head one-fifth of the same. Number of rays in the dorsal and anal fins somewhat greater than in the *S. Fiatola*. The height of the dorsal also a little greater, being contained about three times and a half in the depth: the fifth and sixth soft rays longest. Fleshy part of the tail more slender. Pectorals about the length of the head.

B. 6; D. 7/41; A. 5/40; C. 17, besides several short; P. 23; V. 0.

Length 8 inches 6 lines.

COLOUR.—"Silvery blue above, with regular circular leaden spots."—D. The spots are small, and of nearly equal size: they prevail from the back downwards to about the middle of the depth, and advance a little on the base of the dorsal fin. The arrangement of them is much as described in the "Histoire des Poissons."

Habitat, Chiloe, West Coast of S. America.

It is just possible that this may not be specifically the same as the *S. maculatus* of Cuvier and Valenciennes, but it comes so extremely near that species that I do

not feel authorised in describing it as distinct without seeing more specimens. It is stated by the authors above mentioned, that the fin-ray formula of the *S. maculatus* is the same as that of the *S. Fiatola*: in the specimen here described, the number of rays in the dorsal and anal fins appear to me somewhat greater; but as the spines of these fins are very minute at their commencement, and not readily counted, nor very distinguishable from the soft rays, perhaps the discrepancy may arise from a difference in the mode of computation. What is more to be noted is, that the spots, although they agree in form and mode of arrangement, are said by Mr. Darwin, in his notes taken from the recent fish, to have been "leaden;" whereas it is stated in the "Histoire des Poissons" that they are "yellow." Perhaps they may vary in colour according to the period of the year. There is likewise a difference in locality as regards latitude. The *S. maculatus* is said to be common in the market at Lima, and to have been brought also, both by M. D'Orbigny and M. Gay, from Valparaiso. Mr. Darwin's specimen, however, was taken as far south on the western coast of S. America as Chiloe.

Mr. Darwin's collection contains another specimen, either of the same species as that described above, or one so extremely similar to it as not to be distinguishable in the case of this specimen, which is in too bad preservation to admit of an accurate description of it being given. The following, however, are Mr. Darwin's notes taken from the recent fish:—

COLOUR.—"Whole body silvery; upper part of the back iridescent blue, lower greenish; spotted with coppery-lead circular patches."—D.

This specimen measures ten inches and a half in length. It will be observed that the colour of the spots is still said to have been "lead," though inclining to coppery. It was not taken at the same place as the other, but at Port St. Julian, in central Patagonia; if therefore they are both referable to the *S. maculatus*, this species will have been proved to have a wide range in point of latitude, and also to occur on both sides of the S. American Continent, which is remarkable, considering that it is found so high up the western side as Lima.

FAMILY.—TEUTHYDIDÆ.

1. ACANTHURUS TRIOSTEGUS. *Bl. Schn.*

*Acanthurus triostegus*, *Cuv. et Val.* Hist. des Poiss. tom. x. p. 144.

——— *Hirudo*, *Bonn.* Fish of Ceyl. pl. xi.

This species, which appears to be well known, and to have been described by several authors, was found by Mr. Darwin on coral reefs at the Keeling Islands. Cuvier and Valenciennes observe that it has a wide range through the Indian and



Pacific Oceans. Mr. Darwin's specimen agrees in every respect with the description in the "Histoire des Poissons," except in having one ray more in the anal fin: its length is not quite five inches.

## 2. ACANTHURUS HUMERALIS. *Cuv. et Val.*

*Acanthurus humeralis*, *Cuv. et Val.* Hist. des Poiss. tom. x. p. 170.

FORM.—General form oblong-oval. Greatest depth just behind the insertions of the pectorals; contained exactly twice in the length of the oval of the body (measuring this last from the end of the snout to the base of the caudal spine), and three times in the entire length (measuring this last to the extremities of the lobes of the caudal fin.) Profile convex before the eyes, whence it descends nearly vertically to the mouth. Height of the head a little exceeding its own length. Eyes very high in the cheeks, and in front of each a grooved line passing horizontally forwards towards the nostrils; which last consist of two small round orifices, the anterior one larger than the other, and partially covered by a membranous flap. There are seventeen teeth in the upper jaw, and sixteen in the lower: those above have the cutting edges crenated, and likewise the lateral edges for nearly half way down; this most observable in the middle ones, in which the crenations amount to eight or ten in number: those below similar, but with the crenations not quite so numerous, and in some of the teeth at the sides of the jaw almost confined to the cutting edges. Scales minute; those taken from the middle of the body appear of an oblong form, their apical portions dotted, and ciliated with from twelve to eighteen very minute denticles, their surface marked with extremely fine delicate striæ, not distinguishable without a strong lens.

The lateral line follows the curvature of the back, at about one-fifth of the depth. The spine on the sides of the tail is strong, and sharp-pointed, and very slightly bent. No reclined spine before the dorsal. Both the fin just mentioned and the anal have their soft portions terminating posteriorly in rather an acute angle: also both have a scaly membrane at the base, and rows of minute scales between the soft rays extending for about one-third or more of their length. The first ray of the anal is very minute, and so much concealed in the skin as to be easily overlooked. The filaments of the caudal are sharp-pointed, and extend as far again as the middle rays: the upper one rather longer than the other. The pectorals are contained three times in the length of the oval of the body. Ventrals attached a little further back, sharp-pointed, and terminating in the same vertical line with the pectorals, both being laid back.

D. 9/23; A. 3/23; C. 16, &c.; P. 16; V. 1/5.

Length, to the end of the caudal lobes, 7 inches.

COLOUR.—The colours appear to have been exactly as described in the "Histoire des Poissons." Mr. Darwin's notes taken from the recent fish state, "splendid verditer blue and green;" but do not enter into the details of the markings.

Habitat, Tahiti.

Obtained at Tahiti, where it had been previously found by MM. Lesson and Garnot. Mr. Darwin's specimen accords with the characters given by Cuvier

and Valenciennes, except in having two soft rays less in the dorsal, and one less in the anal. Their description, however, is not very detailed.

## FAMILY.—ATHERINIDÆ.

### 1. ATHERINA ARGENTINENSIS. *Cuv. et Val.?*

*Atherina argentinensis*, *Cuv. et Val.* Hist. des Poiss. tom. x. p. 350.

FORM.—Depth exactly one-sixth of the length, measuring this last to the end of the middle caudal rays. The length of the head is five and a-half times in the same, measuring this last to the end of the caudal lobes. Thickness of the body at least half the depth. Head broad and flat, its breadth across the crown behind the eyes equalling three-fourths of its depth. Snout rounded horizontally, but sharp vertically. The profile is perfectly horizontal; and one uniform straight line extends from the extremity of the upper jaw to the commencement of the second dorsal. Ventral line swelling a little outwards, with its greatest curvature about the middle. Upper jaw a very little longer than the lower, which ascends to meet it at an angle of 45°: gape not reaching more than half-way to the eye, at first horizontal, afterwards deflexed. In each jaw two rows of teeth, stronger and more developed than usual in this genus, widely asunder, and at irregular intervals: in the upper jaw these two rows are equal; in the lower the outer row is stronger than the inner: the outer row above contains about thirty-two or thirty-three teeth; that below twenty-six or twenty-eight: no teeth on the tongue, and scarcely any that can be seen on the vomer or palatines, though a slight roughness can be felt on the last two. Eyes moderately large; their diameter a very little less than one-fourth the length of the head; situate a little in advance of the middle point, and also a little above the middle of the depth. Cheeks and gill-covers scaly. Form of the scales of the body, as well as the number of longitudinal rows, exactly as stated by Cuvier and Valenciennes. The same may be said of the lateral line, and the situation of the dorsal fins. The second dorsal and anal terminate in the same vertical line. Pectorals exactly the length of the head. Ventrals attached immediately below the tips of the pectorals. Breadth of the silver band, which runs straight along the middle of the sides, exactly one-fifth of the greatest depth of the body.

D. 5—1/9; A. 1/19; C. 17, &c.; P. 15; V. 1/5.

Length 8 inches.

COLOUR.—"Silvery, with a silver lateral band: above bluish grey."—D. In spirits, it appears greenish brown, becoming deeper above the silver band and on the ridge of the back: the free margins of the scales are finely dotted with black: the rays of the caudal have been worn at the tips, but there is a trace of the dusky edging noticed by Cuvier: the pectorals are also stained with dusky.

Habitat Maldonado.

I conceive there is but little doubt of this being the *A. Argentinensis* of Cuvier and Valenciennes; but as the description in the "Histoire des Poissons" is short, I have thought it advisable to give a more detailed one of the above



specimen. Mr. Darwin took it at Maldonado, where he states that it is very common, adding that it is sometimes found in brackish water. M. D'Orbigny had also found it previously at the mouth of the Rio Plata.

## 2. *ATHERINA MICROLEPIDOTA*. Jen.

PLATE XVI. Fig. 1. Nat. size.

Fig. 2. *a, b*. Magnified scales.

*A. gracilis*; corporis altitudine partem octavam, capite quintam, longitudinis æquante: oculis mediocribus: maxillis sub-æqualibus, parum protractilibus; commissurâ primum horizontali, deinde paulo deflexâ, haud oculos attingente: dentibus velutinis, serie externâ supra subiusque fortiori: dorsali primâ omnino pone ventrales reclinatas locatâ: squamis parvis, seriebus longitudinalibus octodecim ad minimum dispositis.

D. 5—1/11; A. 1/17; C. 17, &c. P. 15; V. 1/5.

LONG. unc. 4.

FORM.—More slender and elongated than the generality of the species in this genus. Greatest depth not more than one-eighth of the entire length. Head one-fifth of the same. Greatest thickness (in the region of the gills) equalling two-thirds of the depth, or rather more. Ventral line of the body scarcely more curved than the dorsal. The upper profile falls, though very slightly, from the nape to the mouth, and the lower profile inclines upwards to meet it at about the same degree of curvature. Head broad, its breadth across the crown nearly equalling its depth. Snout horizontally rounded. Jaws nearly equal; not so protractile as in some other species: the commissure of the lips at first horizontal, but posteriorly inclining a little downward, and scarcely reaching more than half-way to the eye. In each jaw two rows of slender very distinct teeth, with traces of a third or even fourth row above, towards the middle: outer row longest and most conspicuous, consisting, in the upper jaw, of from forty-five to fifty teeth; in the lower of scarcely more than twenty-five. No teeth that can be seen on the vomer or palatines, though a slight roughness can be felt on both. Eyes of moderate size; their diameter rather more than one-fourth the length of the head; almost entirely before the middle, as well as above it: space between the eyes flat, and exceeding the diameter by about one-third: a slightly elevated line on each side of this space, but no other conspicuous sculpture. Opercle with the descending margin sloping obliquely forwards.

Crown, cheeks, and gill-covers scaly, the scales on the crown extending as far as the eyes. Scales on the body small, the number of longitudinal rows amounting to eighteen or twenty: in form nearly square, the length a little exceeding the breadth, the superficies marked with numerous very distinct concentric lines, the basal half with a fan of from four to six deeper cut striæ, the basal margin rather sinuous, and obsoletely crenate where the striæ meet it. No lateral line very distinguishable.

First dorsal small and delicate, commencing exactly at the middle point of the entire length, measuring this last to the bottom of the caudal fork, and in a line with the tips of the ventrals, these last fins being laid back. Space between the first and second dorsals a little exceeding two-thirds of the depth of the body. Length and height of the second dorsal equal

to each other, and also to the space just alluded to. From the end of the second dorsal to the commencement of the caudal is exactly one-sixth of the entire length. The posterior half of the anal nearly answers to the second dorsal, but the two fins do not terminate exactly in the same line, the dorsal extending a little the furthest. Caudal forked for about half its length. Pectorals about two-thirds the length of the head. Ventrals attached at a point beyond the extremity of the pectorals. Breadth of the silver band about one-fifth the depth of the body.

COLOR.—Not noticed in the recent state. In spirits, the back and sides above the silver band are brownish, with the contour of each scale marked out by black dots. All below the band appears to have been silvery. The band itself is not very brilliant. Both the dorsals, as well as the caudal, are dusky: anal and ventrals pale.

A second specimen does not differ from the above, excepting slightly in the fin-ray formula, which is as follows:

D. 5—1/10; A. 1/15; &c.

Habitat, Valparaiso.

This species was found by Mr. Darwin at Valparaiso in fresh water, in the month of August. It would seem to be nearly allied to the *A. laticlavia* of Cuvier and Valenciennes, brought from the same locality by M. D'Orbigny; but, judging from the short description in the "Histoire des Poissons," it is more elongated, and has the head longer in relation to the depth of the body; also has the silver band narrower. In the *A. laticlavia*, the head is said to be equal to the depth, and to be contained six times in the entire length; the breadth of the silver band to be greater than in any other species. In the *A. microlepidota*, the depth is one-eighth and the head one-sixth of the length: the silver band not broader than in the *A. argentinensis* and some others. The colouring also of the fins appears different in the two species.

## 3. *ATHERINA INCISA*. Jen.

PLATE XVI. Fig. 2. Nat. size.

Fig. 2. *b*. Twice nat. size.

Fig. 2. *a*. Magnified scale.

*A. gracillima*; corporis altitudine partem viâ nonam, capite sextam, longitudinis æquante: oculis mediocribus: maxillis æqualibus, valde protractilibus; commissurâ primum horizontali, posterius deflexâ: dentibus velutinis, in maxillâ inferiore minutissimis: dorsali primâ omnino pone ventrales reclinatas locatâ: squamis mediocribus, seriebus longitudinalibus duodecim ad maximum dispositis, marginibus liberis inciso-crenatis: vittâ laterali nitidè argenteâ.

D. 5—1/8; A. 1/17; C. 17; P. 12; V. 1/5.

D. 5—1/9; A. 1/19; &c.—

D. 6—1/10; A. 1/19; &c.—

LONG. unc. 2. lin. 6.



FORM.—Still more slender and elongated than the last species. Greatest depth scarcely one-ninth of the entire length: head one-sixth. Dorsal and ventral lines very little curved. General characters of the head, snout and mouth, as in the *A. microlepidota*, but the jaws more protractile. A row of minute velutine teeth in each jaw most developed above. Eyes moderately large; their diameter nearly one-third the length of the head; the space between them just equal to their diameter. Opercle with the posterior margin nearly vertical. Scales larger than in the *A. microlepidota*; the number of longitudinal rows not exceeding twelve: their form different, and rather peculiar, the anterior or free edge of each scale in some instances presenting two or three processes, separated by deep incisions; in others being irregularly notched or jagged, according to the spot whence taken: the surface is marked with concentric lines, but there is no fan of striæ on the basal half: the breadth of the scale a little exceeds its length, and the basal margin is irregularly sinuous.

First dorsal answering to the space between the tips of the reclined ventrals and the anal. Length of the second dorsal exceeding the intermediate space between it and the first. From the end of the second dorsal to the caudal is rather more than one-fifth of the entire length. Depth of the caudal fork not exceeding one-third the length of the fin. The anal commences in an exact line with the termination of the first dorsal: rather less than its posterior half answers to the second dorsal. Pectorals rather long, measuring nearly one-sixth of the entire length. Breadth of the silver band one-fourth the depth of the body.

COLOUR.—“Body semitransparent, colourless; with a bright silver band on each side; also marked with silvery about the head.”—D. The band is remarkably bright, and well defined, much more so than in the last species.

I have ventured to consider this as a new species, though none of the specimens in the collection, amounting to three in number, exceed two inches and a half in length, and are probably not full-sized. The form of the scales is so peculiar, that if it were only the young of some described species, it could hardly fail to be identified by such a character, which is not likely to be affected by age, nor to have escaped the notice of an observer. Yet I can find none answering to it in the “Histoire des Poissons.” The silvery band also is remarkably bright; though the slenderness of the body, another of its peculiarities, is perhaps due to immaturity. The fin-ray formula is somewhat different in the three specimens, as shown above, but in other respects they are similar.

Mr. Darwin’s notes state that this species was taken in the month of September, in 39° S. Lat., 61° W. Long., several miles from the land. This last circumstance, indeed, would seem to indicate that the specimens were not so very young, as the fry of most fish keep close in shore.

#### FAMILY.—MUGILIDÆ.

##### 1. MUGIL LIZA. *Cuv. et Val.*?

*Mugil liza*, *Cuv. et Val.* Hist. des Poiss. tom. xi. p. 61.

FORM.—Elongated: the depth contained about five and a half times in the entire length: the head

exactly five times: height of the head at the nape two-thirds its own length. Mouth chevron-formed, with a tubercle at the extremity of the lower jaw: lips thin. Some extremely minute teeth in the jaws, but none on the palate or tongue. Suborbital obliquely truncated at the posterior angle, but not dilated towards the extremity; the lower or anterior margin straight, and scarcely if at all denticulated: the maxillary slender, not longer than the suborbital, and concealed beneath it when the mouth is closed. The eye has an adipose veil covering a large portion of the iris: diameter of the orbit one-fourth the length of the head: distance from the eye to the end of the snout, equalling only three-fourths of the diameter. Orifices of the nostrils widely separate. Number of scales in a longitudinal row about thirty-five; perhaps one or two more: in the depth about twelve. Fourth dorsal spine very weak. A large triangular scale above the pectorals; the same also above the ventrals; this last, which is the longer of the two, equalling one-fourth the length of the fin.

D. 4—1/8; A. 3/8; C. 14, &c. P. 16; V. 1/5.

Length 11 inches 3 lines.

COLOUR.—“Back coloured like Labrador felspar: iris coppery.”—D. The dried specimen shows traces of about twelve longitudinal lines similar to those of many other species.

A second specimen exactly resembles the above, except in being smaller, measuring barely eight inches, and in shewing rather more trace of denticulations on the suborbital.

Habitat, Bahia Blanca and Monte Video.

This species, which has the general characters of the *M. Cephalus* of the European seas, is probably the *M. liza* of Cuvier and Valenciennes; but the specimens are in a bad state of preservation, and some of the characters cannot be accurately ascertained. The depth of the body appears to have been rather greater than what is mentioned in the “Histoire des Poissons:” there is also some appearance of small scales on the second dorsal and anal, which, according to Cuvier and Valenciennes, is the distinguishing characteristic of their next species, the *M. curema*; but it will not agree with this last in its other details.

The larger of the above specimens was taken at Bahia Blanca, where Mr. Darwin’s notes state that it is plentiful; the smaller one at Monte Video.

##### 2. MUGIL — ?

Mr. Darwin’s collection contains a second species of this genus from the Keeling Islands, which does not appear to be identical with any of those described by Cuvier and Valenciennes; but as there is but one specimen, in a very bad state of preservation, and the species inhabiting the Indian Ocean are very numerous, as well as extremely similar to each other, I refrain from describing and naming it as certainly new. I shall therefore merely point out some of its leading characters, so far as they can be ascertained; in the hope that they may prove of use in leading others to identify it who may visit the above Islands hereafter.

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Form and appearance of the mouth similar to that of the *M. laeo* of the Mediterranean. Lips fleshy, and very much developed, with the borders fringed; the lower one partially reflexed. Apparently no trace of teeth anywhere. Suborbital with a shallow notch on its anterior margin, obliquely truncated at its posterior angle, and obsoletely denticulated. Maxillary slender and slightly bent, nearly concealed beneath the suborbital, but showing a little beneath it, from its being a trifle longer. The head is a little less than one-fifth of the entire length: the snout short, and rather obtuse. Longitudinal diameter of the eye contained three and a-half times in the length of the head: no appearance of any adipose veil. Orifices of the nostril approximating. The depth of the body cannot be accurately ascertained, but it appears to have been about one-fifth of the entire length. The commencement of the anal is but very little in advance of that of the second dorsal; both fins appear to have been covered with small scales. Pectorals not quite so long as the head: apparently no elongated scale above them: one, however, above the ventrals, half the length of those fins. The fin-ray formula is as follows:—

D. 4—1/8; A. 3/9; C. 14; P. 16; V. 1/5.

The length of this fish is eight inches.

*DAJAUS DIEMENSIS. Richards.*

*Dajaus Diemensis, Richards.* in Proceed. of Zool. Soc. 1840, p. 25.

This genus, which was established by Cuvier and Valenciennes, differs from *Mugil* principally in having vomerine and palatine teeth: the snout also is rather more produced, and the mouth less chevron-formed. There is but one species described in the “Histoire des Poissons,” which is found in fresh water in the Caribbee Islands. Dr. Richardson has briefly noticed a second from Van Diemen’s Land, in his recent description of a collection of fishes from that country, in the “Proceedings of the Zoological Society.” Mr. Darwin’s collection contains a specimen of this genus from King George’s Sound, which, having reason to think it might be the same as that described by Dr. Richardson, I sent to this latter gentleman, requesting him to compare them. This he obligingly did, and informed me in his answer that he could detect no differences between them, beyond what might be the result of the different manner in which they were preserved, his own specimens being in spirits, and Mr. Darwin’s dried.

I forbear giving a detailed description of this species, as one by Dr. Richardson will appear shortly in the Transactions of the Zoological Society; and Mr. Darwin’s specimen is in such a bad state of preservation, as hardly to admit of an accurate description of it being taken. I may just allude, however, to some of its more striking peculiarities.

It appears to differ from the *D. monticola* of Cuvier and Valenciennes in having the teeth in the lower jaw, if they really exist, so minute and thinly scattered as to be scarcely perceptible; those in the upper jaw, however, are very distinct; so likewise are the vomerine and palatine bands. There are also some very obvious teeth on the tip, and at the sides of the tongue, though few in

the middle: this part is said to be without any asperities in the *D. monticola*. The suborbital is more rounded off at the lower angle anteriorly, and the denticulations thereon rather more numerous and better developed. The scales on the body, those especially above the lateral line, have a few minute teeth on their free edges, communicating a roughness to the touch; a character not alluded to in the description of the *D. monticola*, and which therefore may be presumed absent. There are also three more rays in the anal, and one in the second dorsal.

The depth of the body in this specimen, from its bad state of preservation, cannot be ascertained; but the head is contained about four and a-half times in the entire length. The diameter of the orbit is one-fourth the length of the head; and there is nearly one diameter between it and the end of the snout. The jaws are nearly equal, but when the mouth is closed, the upper one projects a trifle; this last is also moderately protractile. The maxillary retires beneath the suborbital. The fin-ray formula is as follows:—

D. 4—1/9; A. 3/12; C. 14, &c.; P. 15; V. 1/5.

There is but one individual of this species in the collection, which measures seven inches in length. The colours do not appear to have been noticed.

FAMILY.—BLENNIDÆ.

BLENNIUS PALMICORNIS. *Cuv. et Val.*

*Blennius palmicornis, Cuv. et Val.* Hist. des Poiss. tom. xi. p. 159.

The Blenny, which I have referred above to the *B. palmicornis* of Cuvier and Valenciennes, seems somewhat intermediate in its characters between that species and the *B. parvicornis* of the same authors. This inclines me to suspect that the two species are not really distinct, as those authors themselves seem to have thought possible, though they state that they never received the *B. palmicornis*, except from the Mediterranean.\*

In this specimen the head is one-fifth of the entire length, and the ventrals one-eighth, which is worth noticing, because it is stated that in the *B. palmicornis* the head is contained nearly five and a-half times, and sometimes nearly six times in the total length; and the ventrals nearly ten times in the same. The filaments above the eyes, however, are similar to those of the species just mentioned; quite as much developed, and each divided nearly to the base into five or six flattened bristles. There are about forty teeth in the upper jaw, and twenty-eight or thirty in the lower: the canine below is very distinct, but above it is almost, if not quite wanting. The fin-ray formula is as follows:—

D. 11/21; A. 21; C. 11, &c.; P. 13; V. 2.

The length of the specimen is nearly five inches. The anal is marked and coloured exactly as described to be the case in the *B. palmicornis*.

This species was obtained by Mr. Darwin at the Cape Verde Islands.

\* According to Mr. Lowe, however, the *B. palmicornis* is common at Madeira, (see *Proc. of Zool. Soc.* 1829, p. 83), and a specimen received from him, undoubtedly belonging to that species, is in the Museum of the Cambridge Philosophical Society.



1. *BLENNECHIS FASCIATUS*. Jen.

PLATE XVII. Fig. 1.

*B. flavescens, fusco-variatus; maculis tribus infra pinnam dorsalem, et una in pinna ipsius anticam partem, nigris, subocellatis: dentibus maxillaribus supra circiter viginti quatuor, subtus triginta; caninis nullis: tentaculis palpebralis duobus, parvis, subpalmatis: pinna anali haud ultra dorsalem extensa.*

D. 13/16; A. 20; C. 13, &amp;c.; P. 14; V. 2.

LONG. UNC. 2. lin. 4.

FORM.—Body much compressed behind: the depth one-fifth of the entire length: head rather less than one-fourth of the same. Snout blunt and truncated; the profile nearly vertical; the eye placed just within the angle formed by this last with the line of the crown. Diameter of the eye one-fourth the length of the head; distance between the eyes half a diameter; the interocular space very slightly concave, with a double row of mucous pores rather widely separate, but without any lines or sculpture. Similar mucous pores are thinly scattered over the occiput and the front of the snout, as well as beneath each eye. Above each eye is a short slightly palmated filament not exceeding in length the diameter of the eye: also an extremely minute one at each nostril. Mouth reaching to beneath the eyes. Teeth not extending the whole length of the jaws; fine and close-set, with the points of those at the sides, more especially in the lower jaw, reclining backwards; the number above twenty-four, below thirty: no canines. Gill membrane fastened at bottom, the slit at the sides not descending below the pectorals.

The dorsal commences at the nape, and extends nearly to the caudal, with which, however, it is not connected: it is slightly depressed or notched above the twelfth and thirteenth rays, beyond which it is again elevated to the height of the anterior portion. The anal does not approach quite so near the caudal as the dorsal, but the difference is trifling: the last ray in both fins is united by the membrane to the fleshy part of the tail. Caudal rounded, with the greater part of the principal rays slightly divided at the tips. Pectorals broad, and not quite equal to the head in length. Ventrals short, not more than half the length of the head, or a little less than one-eighth of the entire length: they appear to consist of only two rays, but on dissection there will be found three soft rays with a short spine closely adhering to the first of them; the third soft ray is slender, and also adheres to the second.

The anterior portion of the lateral line takes a sweep over the pectoral, and is very distinctly marked by a close series of short elevated mucous tubes between two rows of pores; but the rest of the line is only faintly traced out by nine or ten slender depressed tubes at long intervals, without any accompanying pores.

COLOUR.—(In spirits.) Yellowish ground; the upper half of the sides very much mottled, and clouded with fuscous; three spots darker than the rest, arranged longitudinally beneath the posterior half of the dorsal, and having a subocellated appearance, the last the largest, and also the most distinct of the three: from the median line there are eight or nine descending fasciæ, alternating with the same number of oblong lanceolate spots: the throat is marked with three angulated transverse dark fasciæ: cheeks and gill-covers with small spots. A large black spot on the first three rays of the dorsal fin, which is covered all over with smaller spots, as are also

the pectorals and caudal: anal with a dusky edging. In the living state there were probably some bright colours, as in the *B. biocellatus* of Cuvier and Valenciennes.

A second specimen has the fin-ray formula as follows:—

D. 13/18; A. 21, &amp;c.

This specimen also differs from the one above in having the teeth in the lower jaw not quite so numerous, and the ventrals longer, equalling one-seventh of the entire length. The colours are on the whole similar, but more of the yellow ground is visible above the median line, and the descending fasciæ beneath it are not so distinctly traced out.

Habitat, Concepcion, Chile.

This species is very closely allied to the *B. biocellatus* of Cuvier and Valenciennes, from the same coasts. It agrees with it in all its essential characters, and in the general disposition of the markings. It appears to differ, however, in having fewer teeth; in the anal reaching hardly so far as, certainly not beyond, the dorsal, as described to be the case in that species; in the fin-ray formula; and slightly in the colours. The *B. biocellatus* derives its name from two ocellated spots, one beneath the last rays of the dorsal, the other upon the first three rays of that fin. In the *B. fasciatus* here described, there appear to be three subocellated spots beneath the dorsal, though the last is the most distinct, besides the one upon the fin itself. The *B. biocellatus* was observed by M. Gay at Valparaiso. The present species was taken by Mr. Darwin at Concepcion. Possibly it may be a mere variety.

2. *BLENNECHIS ORNATUS*. Jen.

PLATE XVII. Fig. 2.

*B. cinereo-griseus; maculis, vel lituris paucis, infra pinnam dorsalem obsoletis, pallide nigricantibus: dentibus caninis nullis: tentaculis palpebralis duobus, parvis, subfurcatis: pinna anali haud ultra dorsalem extensa.*

D. 12/17; A. 20; &amp;c.—

LONG. UNC. 2. lin. 2.

FORM.—Closely resembling the last species, but rather deeper in proportion to its length, less compressed in front, with the head more inflated about the throat and gills. Snout, profile, and position of the eye, similar. Superciliary filaments scarcely longer, but rather broader and more conspicuous, and cleft at the extremity. Filaments at the nostrils a little longer, but very slender and delicate. Teeth similar, both in number and form. Fins and lateral line exactly similar. Behind the vent a papilla not present in the last species.

COLOUR.—Different from that of the *B. fasciatus*, but with traces of the same markings. The ground colour is cinereous grey, which almost every where prevails: there are faint traces of the angulated fasciæ beneath the chin, as well as of three dark stains beneath the dorsal, but these last no longer deserve the name of ocellated spots. Fins, cheeks, and gill-covers,



dotted in like manner: also some indication of the larger spot on the first three rays of the dorsal: anal with the same dusky edging.

*Obs.* Of this species there are five specimens in the collection. The next in size to the one described above, measures one inch seven lines in length, and resembles it in every respect, excepting that the superciliary filaments are broader and longer, equalling at least one diameter and a half of the eye. The colours and markings are exactly the same, only the fasciæ on the throat can hardly be discerned.

No. 3 is exactly similar in size, as well as in all its other characters, to No. 2. Has the superciliary filaments equally developed.

No. 4 resembles Nos. 2 and 3, but is smaller, measuring one inch five lines in length.

No. 5, the smallest of all the specimens, and measuring only one inch three lines, has the dark markings more developed, especially the angulated fasciæ on the throat, which are almost as distinct as in the *B. fasciatus*: the spots beneath the dorsal assume the appearance of abbreviated transverse fasciæ reaching from the base of the fin to the median line; and besides the three faintly indicated in the other specimens, there are two others nearer the head, forming altogether a series of five. In this specimen the superciliary filaments are shorter, not exceeding the diameter of the eye.

Habitat, Coquimbo, Chile.

This species differs but slightly from the last, and both may hereafter prove to be mere varieties of the *B. biocellatus*; but it is desirable for the present to keep them distinct, as, though all found on the same coast, they are from distinct localities on that coast. Also the above five specimens, though varying in the intensity of the markings, have all a ground colour quite different from that of the *B. fasciatus*, and a peculiarity of aspect immediately noticeable to the eye. Had they been found mixed with that species, the presence of the anal papilla might lead to the suspicion of their being the other sex; but, under the circumstances, this seems hardly probable. They were all taken at Coquimbo.

#### 7. SALARIAS ATLANTICUS. *Cuv. et Val.*

*Salaris atlanticus*, *Cuv. et Val.* Hist. des Poiss. tom. xi. p. 238.

Two individuals of this species were obtained by Mr. Darwin at Porto Praya. They accord in all respects with the descriptions in the "Histoire des Poissons," excepting as regards the fin-ray formula, in which there is a slight difference observable; and in this respect they are also different from each other.

The larger specimen, measuring three inches seven and a half lines in length, has the fin-ray formula as follows:

D. 13/21; A. 24; C. 13; P. 15; V. 2.

The other, two inches eleven lines in length, has one ray less in the spinous portion of the dorsal, and two more in the soft:

D. 12/23; A. 24; &c.—

It may be mentioned that in this species, as in some others, the last spinous ray in the dorsal is entirely invested by the membrane, and does not attain to the margin, so that in counting, it may be very easily overlooked.

In Mr. Darwin's notes, it is stated that this species bites very severely, having driven its teeth through the finger of one of the officers in the ship's company. Its two very long sharp canine teeth at the back of the lower jaw are well calculated to inflict such a wound.

#### 2. SALARIAS QUADRICORNIS. *Cuv. et Val.?*

*Salaris quadricornis*, *Cuv. et Val.* Hist. des Poiss. tom. xi. p. 243. pl. 329.

Mr. Darwin's collection contains a species of *Salaris* so closely resembling the *S. quadricornis* of Cuvier and Valenciennes, that I dare not describe it as distinct. Yet it offers some slight differences as follows:

The profile, instead of being merely vertical, presents a rounded and projecting front between the eyes, advancing further than the mouth (as in the *S. gibbifrons*, *Cuv. et Val.*) The filamentous appendages are similar, but the superciliary ones are shorter than the diameter of the eye: the palmated ones at the nostrils consist of six or seven bristles. The occipital crest is hardly so much elevated; its height being not more than one-sixth or one-seventh the height of the head, and only one-third its own length. The height of the dorsal equals at least half the depth of the body; the depth of the notch above the thirteenth spinous ray is rather more than half its height. The fin-ray formula is—

D. 13/21; A. 25; C. 13, &c.; P. 14; V. 2.

The colour, as it appears in spirits, is nearly of a uniform olivaceous brown, with scarce any indication of vertical bands; paler on the abdomen. There are four or five oblique narrow whitish lines on the dorsal, but not very distinct; also two on the anal, more decided: these lines appear to have been bluish, and there are traces of the same colour about the head and gill-covers.

In all other respects it accords exactly with the description in the "Histoire des Poissons," where it is added, in reference to colour, that this species is subject to much variation. Mr. Darwin's specimen measures five inches two lines in length. The number attached to it has been lost, so that there is nothing to shew where it was taken. It is probably, however, from the Keeling Islands, as there is in the collection, from that locality, another specimen, which I have little doubt of being the female of the one above noticed.

This second specimen wants the nuchal crest, as is stated to be the case in the female of *S. quadricornis*. It is not full sized, measuring only three inches four lines in length, which may account for the proportions being a little different from those of the adult. The depth is one-sixth of the entire length, or rather less. The filamentous appendages resemble those of the first specimen, but the nasal ones have rather fewer bristles. In the form of the head,



fins, and all its other characters, it is exactly similar. The fin-ray formula is a little different;

D. 13/20; A. 23; &c.—

The *colours*, also, as they appear in spirits, are rather different. The general ground of the body is olivaceous grey, but paler than in the male specimen, and inclining to yellowish, with faint indications of vertical bands, and also a few dark spots towards the tail end. Dorsal and anal spotted, the former more so than the latter. Mr. Darwin's notes, taken from the recent fish, merely state,—“with dull red transverse lines.”

The *S. quadricornis* is stated by Cuvier and Valenciennes to be very common at the Mauritius, whence it may not improbably range as far eastward as the Keeling Islands.

### 3. SALARIAS VOMERINUS. *Cuv. et Val.?*

*Salarias vomerinus?* *Cuv. et Val.* Hist. des Poiss. tom. xi. p. 258.

PLATE XVII. Fig. 3.

FORM.—Elongated and compressed, the thickest part being in the region of the gills. Greatest depth contained about six and a-half times in the entire length: thickness at the pectorals about two-thirds of the depth, or rather more. Length of the head rather exceeding the depth of the body, and exceeding its own depth by about one-fourth. Snout obtuse; broad and rounded when viewed from above. Lips crenated at the sides of the mouth, but not in the middle. Teeth in the jaws moveable, extremely fine and numerous: two long canines at the bottom of the lower jaw, curving backwards, and fitting into two corresponding holes in the palate: also a transverse row of minute teeth on the front of the vomer. Profile nearly vertical; the eyes placed just within the angle formed by it with the line of the crown. Two broad palmated superciliary filaments, not equal in length to the diameter of the eyes: two similar ones at the nostrils, each consisting of six or eight bristles: also two short simple filaments, one on each side of the nape.

The dorsal, which commences a little behind the nuchal filaments, is so deeply notched behind the twelfth ray as almost to appear like two fins. The height of the anterior or spinous portion is about two-fifths of the depth: the posterior is more elevated, equalling three-fourths of the depth: this portion is connected by its membrane with the upper part of the tail, but does not reach to the caudal, leaving an interval just equal to half the depth of the tail at this point. The anal commences opposite the eleventh ray of the dorsal, and does not reach so far as that fin, leaving three times the space between it and the caudal: the first two rays short and soft, the first scarcely connected by membrane with those that follow; the membrane deeply notched between all the rays, excepting the last three, where it is continuous. Caudal slightly rounded at the extremity. Pectorals broad, but a little pointed when the rays are not spread out; longer than the head, the fifth and sixth rays from the bottom being longest. Ventrals short, only half the length of the pectorals, or one-tenth of the entire length, consisting (which is unusual in this genus) of four distinct rays, two shorter and slender ones, besides the two ordinary thick ones.

The lateral line is faintly indicated by a fine line which sweeps over the pectorals, and then passes off straight along the middle. As far as the pectorals reach, the line is continuous:

beyond, it is interrupted, or only marked out by slightly elevated tubal pores at intervals; and it disappears altogether considerably before reaching the caudal.

D. 12/15; A. 18; C. 13, &c.; P. 14; V. 4.

Length 3 inches 2 lines.

COLOUR.—(*In spirits.*) The ground appears to have been pale yellowish-brown: sides marked with numerous approximating dark transverse fasciæ, twelve or fourteen in number: these fasciæ are continued on to the caudal, where there are five, narrower than those on the body. Head marked with black dots and undulating lines; especially two undulating lines commencing on the cheeks behind the eyes, and passing upwards to the nape: upper lip and sides of the throat marked with several fine lines. A row of black dots a little below the base of the anterior part of the dorsal. The fasciæ on the sides extend on to the dorsal, where they take an oblique direction backwards. Anal pale at the base, but with the tips of the rays dusky. Pectorals and ventrals uniformly plain dusky.

Habitat, Porto Praya, Cape Verde Islands.

Cuvier and Valenciennes state that they have received but one species of *Salarias* from the Atlantic Ocean north of the line, the *S. Atlanticus* already noticed. The present is a second found within that range, obtained by Mr. Darwin at Porto Praya. Perhaps it may be a new one; but it is so very nearly allied to the *S. vomerinus* of the above authors, that I consider it hazardous to describe it as distinct. It agrees especially with that species in having vomerine teeth, and four rays in the ventrals, as well as in the general disposition of the markings; but no mention is made in the “Histoire des Poissons” of the nuchal filaments, which, however, may have been overlooked, as they are small and simple, and not very obvious. If it be identical with that species, its range in the Atlantic must be considerable, as the *S. vomerinus* is found on the coast of S. America, near Bahia. Generally speaking the same species are not observed on both sides of that ocean; and perhaps this is an argument for its being distinct: but if so, it is difficult, without the opportunity of a more close comparison, to point out any essential differences by which it may be characterized.

This species appears also to have many points of agreement with the *S. textilis* brought by MM. Quoy and Gaimard from the Island of Ascension; but the colours do not exactly correspond, neither is there any mention made in the description of this last, of the vomerine teeth and four ventral rays, which so peculiarly characterize the one above noticed.

As I feel some doubts with respect to this species being new or not, I have thought it advisable to have it figured, more especially as there is no figure, either of the *S. vomerinus* or *S. textilis*, to both which it is so nearly allied.



## CLINUS CRINITUS. Jen.

PLATE XVIII. Fig. 1.

*C. fuscus, nigro-maculatus: tentaculis palpebralis e crinibus octo a radicibus separatis formatis, nasalibus et nuchalibus palmatis, omnibus parvis subæqualibus: pinna anali radiis mollibus viginti quatuor.*

B. 6; D. 26/11; A. 2/24; C. 13; P. 13; V. 3.

LONG. unc. 6. lin. 6.

FORM.—Depth one-fifth of the entire length. Head about one-fourth of the same, rather large, with the cheeks and gills a little inflated. Profile falling gently from the nape: the crown scarcely at all convex. Gape reaching to beneath the anterior part of the eye. Lips thick and fleshy, and partly reflexed, much resembling those of a *Labrus*. Lower jaw projecting a little beyond the upper, and inclining upwards to meet it. An outer row of strong conical teeth in each jaw, with a velutine band behind; the band broad above, but very narrow below. A largish triangular patch of velutine teeth on the vomer, and a smaller one on each palatine. Tongue free and fleshy, smooth. Eyes moderately large, their diameter one-fifth the length of the head; high in the cheeks, reaching to, but not interrupting, the line of the profile. The superciliary tentacles consist each of eight short bristles, all separate to the root, but forming together a closely compacted series: two on the nape, of the same length as them, are broad and palmated, the upper half only being divided into eight or ten slender filaments: two on the nostrils are similar to those on the nape, only somewhat smaller.

The dorsal commences at the nape, a little behind the nuchal appendages, and has the spinous portion long, and of nearly uniform height, but no where very high. The spines increase very gradually in length as they advance, the first being the shortest: in the middle of the fin, they equal about one-third the depth of the body, or hardly so much: above each is a short filamentous tag, as in the *Labridæ*. The soft portion is nearly twice the height of the spinous. A small interval between the termination of this fin and the caudal. The anal commences under the twelfth spine of the dorsal: its own two spines are very short, and not half the length of the soft rays, which last are not quite so long as those of the dorsal: the membrane between each of the rays is deeply notched. This fin terminates a very little before the dorsal. The caudal, when expanded, appears slightly rounded. Pectorals broad and rounded, about one-fifth of the entire length. Insertion of the ventrals directly underneath the commencement of the dorsal, and both in a vertical line with the posterior margin of the preopercle. These last fins are contained nearly nine times in the entire length.

Body covered with moderately small scales; the length and breadth of each scale nearly equal, with the basal portion nearly covered by an irregular fan of striæ, eighteen or twenty in number. Head naked, but the crown and upper part of the snout studded with papillæ, terminating upwards in pores. There are rows of minute scales between the rays of the dorsal for about one-third of their height; also at the base of the caudal and pectorals, but none on the anal. The lateral line commences behind the upper angle of the opercle at one-fourth of the depth; when opposite the eleventh ray of the dorsal, it begins to bend downwards, and continues falling till opposite the seventeenth ray, when it gets to the middle of the depth; from that point it passes straight to the caudal.

COLOUR.—(*In spirits.*) Nearly uniform dark brown ground, but with some indications of round black spots, which were probably more conspicuous in the living fish. Eight or nine of these spots appear on the posterior half of the dorsal, forming a longitudinal row; and there is a row more faintly marked out along the base of the anal; these last are smaller than those on the dorsal. Chin, throat, and gill-membrane, thickly covered with small spots: also a black patch extending over a large portion of the eye from above and behind.

Habitat, Coquimbo, Chile.

This species, obtained by Mr. Darwin at Coquimbo, is nearly allied to several other Chilean species, described by Cuvier and Valenciennes, but differs from all of them in having more rays in the anal fin, independently of other respects. It seems to approach most closely the *C. variolosus*; but this latter is represented as having the superciliary tentacles palmated, composed of from twelve to fifteen bristles, and the nuchal ones papilliform and so small as to be hardly visible. In the present species, the superciliary tentacles consist, as above stated, of eight bristles separate quite to the root, while those on the nape are equally as large and as much developed, and strictly, as well as very distinctly, palmated. The crown also is scarcely convex, as represented to be the case in that species: to which it may be added, that the spots on the dorsal fin are more numerous, and their relative size compared with those on the anal different.

The *C. microcirrhis* is said to want superciliary tentacles altogether, otherwise there are several points of resemblance between that species and the one here described.

## GENUS.—ACANTHOCLINUS. Jen.

*Corpus elongatum, compressum, squamis minutissimis obtectum. Caput nudum, tentaculis nullis. Dentes maxillares seriebus plurimis dispositi, velutini; multis, hic illic sparsis, fortioribus, subconicis vel aculeiformibus: vomerini et palatini velutini omnes. Linguae linea longitudinalis media dentibus minutissimis aspera. Membrana branchialis undique libera, subter gulam continua et profundè emarginata, sex-radiata. Pinnae dorsalis et analis spinis plurimis, ad apices laciniis membranceis investitis. Lineae laterales tres distinctæ.*

Mr. Darwin has brought home several specimens of a small fish from New Zealand, which appears to me to form the type of a new genus in the family of the Blennies. It is most nearly allied to *Clinus*, to which group it may perhaps be subordinate in point of value; but it offers several differences which I shall proceed to point out. In the first place the number of anal spines is much greater, a character of considerable importance in this family, in which they hardly ever amount to more than two, whilst in some instances all the rays of this fin appear to be articulated. Secondly, in addition to the bands of vomerine and palatine



teeth, which are found in *Clinus*, this genus has a narrow line of very minute teeth running longitudinally down the middle of the tongue, communicating a sensible roughness to the touch. Thirdly, the ventrals are more backward, their point of insertion being only a very little in advance of that of the pectorals. Lastly, it is remarkably characterized by having three, or one might almost say four, distinct lateral lines. The uppermost of these lines commences at the posterior angle of the opercle, whence it turns abruptly upwards and runs immediately beneath the base of the dorsal: the second runs along the median line of the body, but does not commence till a little beyond the base of the pectoral: the third commences a little above the insertion of the ventrals, and answers to the upper one, taking its course a little above the anal: there is also part of a fourth, which originates between the ventrals, and joins the third at the commencement of the anal. All these lines are marked by larger and differently formed scales from those on the body, (which last are very minute,) with an elevated tube on each, the tubal pore, however, being most distinct on the middle or second line. In its general form, and in the large number of dorsal spines, this genus resembles *Clinus*: the form of the head and mouth are for the most part similar; also all the parts of the gill-cover; as well as the branchial membrane, which is six-rayed and free all round. The tags at the tips of the dorsal and anal spines are very conspicuous, and give those fins somewhat of a *labriform* appearance.

It is not improbable that the *Clinus littoreus* of Cuvier and Valenciennes, which they have characterized from a drawing and description in the Banksian Library, and which is said to possess twenty-five spines in the anal fin, may belong to this new genus. It is observed by those authors, in reference to its peculiarity in this respect, that such a circumstance, if correct, would be unexampled, and would tend to separate it from the genus in which they have placed it. It is also worth remarking that the *C. littoreus* comes from New Zealand, the same country as that whence Mr. Darwin obtained the above.

In the circumstance of having three lateral lines, this new genus seems to have some affinity with *Chirus* of Steller; but the scales are not ciliated as they are said to be in this last, neither are the ventrals five-rayed.

ACANTHOCLINUS FUSCUS. *Jen.*

PLATE XVIII. Fig. 2.

FORM.—Body elongated and compressed; the depth, which varies but little, one-sixth of the entire length; thickness in the region of the pectorals rather more than half the depth. Head contained very little more than four times in the length. Profile sloping but very little. Snout rather short: mouth protractile, and rather wide: lips somewhat fleshy and reflexed. Gape reaching to beneath the anterior part of the orbit, but the maxillary, which is dilated at its

posterior extremity, and cut nearly square, reaching to beyond the middle. Lower jaw a little the longest, and ascending to meet the upper. Several rows of sharp velutine teeth in each jaw, with some here and there stronger and more hooked than the others, those below almost fine card: a band on the vomer and on each palatine. Tongue of a triangular form, free and pointed at the tip, with a ridge of asperities down the median line. Eyes high, but hardly interrupting the line of the profile; their diameter one-fifth the length of the head; distant one diameter from the end of the snout. No filamentous appendages of any kind on any part of the head; but an irregular circle of pores nearly surrounding the orbit; also a few very distinct pores beneath the lower jaw. Preopercle rounded, with distant pores along the margin. Opercle terminating posteriorly in a sharp salient angle with the basal margin ascending; beneath which the subopercle and interopercle are both very distinct. Branchial membrane free and open all round, not adhering to the isthmus underneath, but deeply notched in the middle.

The dorsal commences in a line with the posterior point of the gill-cover, and is very similar to that of *Clinus*. Spinous portion long, and, excepting the first two rays, of nearly uniform height, equalling nearly half the depth; the membrane deeply notched between the spines, the tips of which are invested with filamentous tags. Soft portion of the dorsal more elevated than the spinous, and with only four rays. Between the end of this fin and the caudal is a small space equalling nearly two-thirds of the depth beneath. The anal commences under the twelfth dorsal spine, and exactly corresponds to the posterior half of that fin, reaching also to the same point. The spines in both fins are sharp and moderately strong; the soft rays articulated and branched, and terminating rather in a point behind. Caudal rounded, with fourteen branched rays, and a few shorter simpler ones. Pectorals one-seventh of the entire length, rounded when spread open, with all the rays except the last branched. Ventrals narrow and pointed, about the same length as the pectorals, and inserted but very little in advance of those fins: the spine well developed, and half the length of the soft rays: first soft ray long, and deeply divided so as to appear like two; the second ray slender and shorter.

Body covered with very minute scales; but none on the head or on any of the fins. Three very distinct lateral lines, with a portion of a fourth, as already stated above.

B. 6; D. 20/4; A. 9/4; C. 16, &c.; P. 17; V. 1/2.

Length 3 inc. 8 lin.

COLOUR.—Not noticed in the recent state. *In spirits* it appears of a nearly uniform bister brown, with the fins and some portion of the head darker than the rest, especially a blackish spot on the opercle.

Habitat, Bay of Islands, New Zealand.

There are four specimens of this new fish in the collection, all similar except in size. The above is the largest. The others measure in length from one inch and three quarters, to not quite three inches. The two largest are from the Bay of Islands, New Zealand. The other two have lost their labels: I only presume therefore that they are from the same locality.



TRIPTERYGION CAPITO. *Jen.*

PLATE XIX. fig. 1.

*T. fusco-griseum, pinnis concoloribus: tentaculis palpebralis duobus parvis gracilibus e crinibus duobus vel tribus formatis; nasalibus minutis simplicibus: dorsali primâ humili sex-radiatâ, radiis subæqualibus; secundâ duplo altiore; tertiâ parum altissimâ: lineâ laterali abbreviatâ, vix ultrâ pectorales extensâ.*

B. 6; D. 6—20—14; A. 25; C. 14, &c.; P. 16; V. 2.

LONG. unc. 2. lin. 5.

FORM.—Depth at the pectorals one-sixth of the length: thickness at the same part about two-thirds of the depth. Head rather large, thicker than the body, contained four and a half times in the entire length. Snout short, the profile falling very abruptly from between the eyes. These last large, one-third the length of the head, high in the cheeks, reaching to, but hardly interrupting, the line of the profile. Above each a short slender compound tentacle: that on the right side consists of two filaments, one simple, the other forked, so as to appear like three; that on the left appears undivided. Also a minute filament at each nostril. The maxillary reaches to beneath the middle of the orbit. Jaws equal: in each a row of small conical sharp-pointed teeth, with a broad velutine band behind, the band, however, only in front. A transverse band of velutine teeth on the vomer, extending a little on to the palatines. Opercle and preopercle rounded. Branchial membrane free all round, with a shallow notch in the middle underneath.

The first dorsal commences in a vertical line with the insertions of the ventrals; the rays are six in number, and so nearly equal in length as to cause the fin to appear quite even; its height is scarcely more than one-third of the depth. The second dorsal begins a little behind the origin of the pectorals: it is also nearly even, but twice the height of the first. The third closely follows the second: this fin is uneven, but its most elevated point is somewhat higher still than the second. The rays of the first and second of these fins are spinous: those of the third soft and articulated, but all simple. The anal, which has also simple rays, commences beneath the middle of the second dorsal, and terminates in the same vertical line with the end of the third, between which last and the caudal is a small space. Caudal square, with twelve of the principal rays branched. Pectorals a little less than one-fourth of the entire length; the ninth and tenth rays longest; the six lowermost rather stouter than the others, and, as well as the three uppermost, which are very slender, simple; the fourth to the tenth, both inclusive, branched. Ventrals contained about six and a half times in the entire length; consisting of only two slender filamentous rays.

Scales minute, their free edges finely ciliated; the concealed portion of each scale marked with twelve or fourteen striæ. The lateral line rises at the upper angle of the opercle, and is well marked by a row of tubular scales till it reaches a little beyond the extremity of the reclined pectoral, where it abruptly terminates, and all further trace of it is lost.

COLOUR.—(*In spirits.*) Of a nearly uniform dark brown, inclining to griseous, with some appearance of darker clouds or spots between the second dorsal and the lateral line; this last also is indicated by a darker streak than the ground colour. Fins dark brown: there is, however, some trace of a white edging to the anterior half of the anal, which may have been more conspicuous in the living state.

A second specimen slightly differs from the above, but is evidently referable to the same species. It is smaller; and the profile falls more gradually. The caudal has only eight branched rays, with two lateral simple ones. The pectorals have the tenth and eleventh rays longest, with the seven lowermost (instead of six) stouter than the others and simple. The fin-ray formula is also different.

D. 6—19—13; A. 25; C. 10, &c.; P. 17; V. 2.

Length 2 inc. 1 line.

The colours are paler, and more decidedly grey, with the darker mottlings more distinct. The dorsals and caudal are pale, minutely dotted with brown. Tips of all the anal rays white.

Habitat, Bay of Islands, New Zealand.

This species approaches very closely the *T. nigripenne* of Cuvier and Valenciennes, of which it may possibly be a variety; but the description in the "Histoire des Poissons," as regards the form, is limited to a very few words. If the figure given by those authors be correct, the *T. nigripenne* differs decidedly in the first dorsal being more elevated, with the rays more unequal, and in the lateral line extending the whole length of the fish. In the present species the first dorsal is low and even, with the rays all equal, and the lateral line cannot be traced much beyond the pectoral; and these characters are found in both specimens. There are also six rays in the first dorsal. According to the description, the *T. nigripenne* has but five, though six are represented in the figure.

From the *T. varium*, this species differs not only in its fin-ray formula, but in its markings: and the same characters serve to separate it still more widely from *T. Forsteri* and *T. fenestratum*.

This species was obtained by Mr. Darwin on tidal rocks in the Bay of Islands, New Zealand. Three out of the only four extra-european species described by Cuvier and Valenciennes come from the same locality.

## FAMILY.—GOBIDÆ.

1. GOBIUS LINEATUS. *Jen.*

PLATE XIX. fig. 2.

*G. nigro-griseus, lineis circiter decem longitudinalibus nigris: capite lato, subdepresso; genis inflatis: maxillis æqualibus: dentibus velutinis, externis fortioribus aculeiformibus; caninis nullis: oculis amplis, intervallo vix plus quam semidiametrum æquante: pinnis dorsalibus contiguis, altitudine subæqualibus; pectoralibus radiis supernis setaceis, liberis; caudali rotundatâ: squamis mediocribus, levissimè ciliatis.*

B. 5; D. 6—1/9; A. 1/8; C. 13, &c.; P. 7 et 16; V. 1/5.

LONG. unc. 4. lin. 8.



FORM.—Head large, sub-depressed, and much inflated about the gills: body compressed towards the tail. Depth at the pectorals contained about five and a half times in the length: thickness at the same point about three-fourths of the depth. Head about four and a half times in the length; its breadth nearly equal to its own length. Profile nearly horizontal. Eyes moderately large, with a diameter nearly one-fourth that of the head: the intermediate space a little hollowed out, and scarcely more than half a diameter in breadth. Some appearance of a shallow groove on the nape reaching to the first dorsal. Gape reaching to beneath the anterior angle of the eye. Jaws equal: each with a broad band of velutine teeth, the outer row stronger than the others, and slightly hooked; of these stronger ones there are twenty six in the upper jaw; below they are fewer, smaller, and more irregular: no canines: no vomerine or palatine teeth.

Pectorals about one-fifth of the entire length, oval; the first six or seven rays nearly free to their base, and setaceous, like those of *G. niger*; the sixteen that follow connected by membrane as usual, and much branched. Ventrals united in the usual manner, and a little shorter than the pectorals. The first dorsal commencing a very little behind the point of attachment of the pectorals, and reaching to the extremity of those fins when laid back: the anterior spines rather exceeding in length half the depth of the body; the last three gradually decreasing, with the membrane terminating at the foot of the second dorsal. This last fin with the first ray simple, and of the same height with the anterior rays of the first dorsal; those which follow, to the number of nine, nearly of the same height, and branched; from the root of the ninth springs a simple ray which might be reckoned as distinct, and if so, the entire number would be ten. Anal commencing a little more backward, and terminating a little sooner than the second dorsal, to which in other respects it answers; the last ray double as before: both these fins terminate in a point behind. Space between the anal and the caudal rather more than one-fifth of the entire length, and equalling twice the depth immediately beneath. Caudal rounded, about one-sixth of the entire length; the division between the principal and accessory rays (which last are numerous, especially above), not well marked; the former much branched. The usual papilla behind the vent.

No visible lateral line. Scales rather large; about thirty-seven in a longitudinal line, and eleven in a vertical; ciliated, the concealed portion of each scale with an irregular fan of very numerous striæ, amounting to twenty-five or more. Skin of the suborbital marked with four longitudinal lines of salient dots, the third from the top forking posteriorly into two: a similar line at the upper part of the opercle at the boundary of the scales, whence another passes vertically across the branchial membrane; behind this is a third shorter one, taking an oblique direction backwards.

COLOUR—(*In spirits.*) Dusky grey, with about ten, rather indistinct longitudinal dark lines on the body, extending from the pectorals to the caudal. Fins dusky, with some indication of small irregular whitish spots scattered here and there. A dark spot on the upper half of the eye.

Habitat, Galapagos Archipelago.

This is undoubtedly a new species. It belongs to the same section as the *G. niger* of the European seas, which in form it very much resembles, especially in its large inflated head, and in having the uppermost rays of the pectorals free and setaceous. It differs, however, in having fewer rays in the dorsal and anal

fins, and consequently a larger interval between the anal and the caudal; also, in the number and arrangement of the dotted lines on the cheeks. The colours are likewise different; and, in the living fish, in which they were not noticed, probably the dark longitudinal lines, alluded to in the description above, are much more conspicuous than they are at present.

This species was taken by Mr. Darwin off Chatham Island, in the Galapagos Archipelago.

## 2. GOBIUS OPHICEPHALUS. *Jen.*

PLATE XIX. FIG. 3

*G. pallenti-plumbeus, fusco-reticulatus: corpore elongato, gracili, undique alepidoto: capite lato, depresso, genis tumidis; his et rostro punctis valde salientibus, creberrimis, lineis undantibus dispositis: maxillis æqualibus: dentibus velutinis; externis, præsertim lateralibus, fortioribus, aculeiformibus; caninis nullis: oculis parvis, prominulis, intervallo plus quam diametrum æquante: pinnis dorsalibus subcontiguïs, altitudine subæqualibus; pectoralibus radiis omnibus membranâ inclusis; caudali rotundatâ, radiis clausis, subacutâ.*

D. 8—1/16; A. 1/13; C. 17, &c.; P. 21; V. 1/5.

LONG. unc. 2. lin. 11.

FORM.—Body considerably elongated, and compressed posteriorly: the greatest depth beneath the first dorsal, equalling rather less than one-eighth of the entire length: thickness at that point rather less than the depth. Head broader than the body, very much flattened in the crown behind the eyes, with the cheeks tumid, and, on the whole, snake-like in appearance: its length one-fifth of the entire length; its breadth two-thirds of its own length. Eyes small, but rather prominent, high in the cheeks, with a diameter scarcely exceeding a line in length, or about one-sixth that of the head; the space between a little hollowed out, and nearly a diameter and a half across. Snout short and obtuse: jaws equal; the gape not quite reaching to beneath the middle of the orbit. The teeth form a broad velutine band in each jaw, with those in the outer row strong and slightly hooked: of these last there are about twenty in the upper, the lateral ones being stronger than those in front; in the lower they are not so numerous, and more irregular: none that can be strictly called canines: likewise no vomerine or palatine teeth.

Pectorals one-sixth of the entire length, oval, with the middle rays longest; all the rays included in the membrane. Ventrals united; about two-thirds the length of the pectorals. First dorsal extending beyond the extremities of the pectorals; the rays very gradually decreasing in length, the membrane beyond the last also sloping very gradually down till it nearly reaches the second dorsal, which it does not quite touch. Rays of the second dorsal of nearly uniform height, about equalling the longest of those in the first, also equalling the depth of the body beneath. The last ray in both these fins is double, as in the last species. The anal commences beneath the fourth ray of the second dorsal, and terminates a little sooner than that fin. The caudal, when the rays are spread, appears rounded; but when closed, somewhat pointed:



it is contained not quite six and-a-half times in the entire length. The space between the anal and the caudal is one-eighth of the same, and one and a half times the depth of the tail at that part. The usual papilla appears behind the vent.

Skin apparently quite naked everywhere, and without any scales that are visible, even in the dried state, under a lens. The lateral line runs straight along the middle, and is marked by a series of glandular dots placed in threes or fours together vertically at moderate intervals. Several lines of dots about the head, but the dots are here closer together, and in some places so salient as to appear like short filamentous processes: on the cheeks, about the eyes, and on the front of the snout, these lines undulate in an irregular manner: there are also two or three short lines of dots on the gill-cover, and a double row on each side of the lower jaw, passing obliquely upwards posteriorly, as a boundary to the cheek.

COLOUR.—“Pale lead-colour, coarsely reticulated with brown.”—D.—This is nearly as it appears also in spirits. The reticulations are finer on the head, where they are also most distinct: they are likewise very visible at the base of the pectorals.

Habitat, Chonos Archipelago, South of Chiloe.

Cuvier and Valenciennes seem to have doubted \* whether there were really any species in this genus absolutely without scales, though they have established a section, in which the scales are very minute, and as it were lost in the skin. The present one, however, appears to be thus characterized: at least there are no scales which can be detected, even with the assistance of a lens, and when the skin is suffered to become dry, in which state they are generally visible, if really present. In fact, the skin is as smooth and naked as in any of the true Blennies. This character, combined with others, clearly indicates it to be a new species; neither will it assimilate with any of the sections in the “Histoire des Poissons;” but requires to be placed in one by itself, in which the absence of scales is coupled with an elongated body, and a caudal, not strictly pointed, but approaching to that form, when the rays are close.

This species was obtained by Mr. Darwin in the Chonos Archipelago, in Lowe's Harbour, S. of Chiloe. It appears to be the first of this genus brought from the West Coast of America; at least, there are none, amongst the very numerous species described by Cuvier and Valenciennes, which are mentioned as belonging to those shores.

#### ELEOTRIS GOBIOIDES. *Cuv. et Val.*

*Eleotris gobioides*, *Cuv. et Val.* Hist. des Poiss. tom. xii. p. 186.

This species was taken by Mr. Darwin in fresh-water, in the Bay of Islands, New Zealand. It so well accords with the description of the *E. gobioides* in the “Histoire des Poissons,” that I conceive there can be no doubt of their identity.

\* See “Hist. des Poiss.” tom. xii. p. 72, under the species *Gobius Boscii*.

The profile slopes very gently. The lower jaw is longest, ascending to meet the upper. There are three or four longitudinal lines on the sides of the head, especially a very well marked one (not particularly noticed by Valenciennes) extending backwards from the posterior angle of the eye to the upper angle of the gill-opening. No appearance of any lateral line. This specimen has a ray more in the anal than Valenciennes gives. The fin-ray formula is as follows:—

B. 6; D. 6—1/10, the last double; A. 1/10, the last double; C. 16, &c.;

P. 18; V. 1/5.

Length 4 inches 1 line.

This species, except in respect of its separate ventrals, has very much the habit and general appearance of the *Gobius niger* of the European seas.

#### FAMILY.—LOPHIDÆ.

##### BATRACHUS POROSISSIMUS. *Cuv. et Val.?*

*Batrachus porosissimus*, *Cuv. et Val.* Hist. des Poiss. tom. xii. p. 373.

FORM.—Head very large, broad and depressed, exactly one-fourth of the entire length; its breadth two-thirds of its own length. Body compressed posteriorly, with its greatest depth about one-sixth of the entire length. Snout blunt and rounded, the lower jaw projecting; gape wide. The teeth above form but a single row along the intermaxillary, mostly small, but sharp, and the posterior ones much curved: along each palatine there is a row of much stronger ones, and at each angle of the vomer are two very long hooked ones, resembling true canines. In the lower jaw the teeth are in a single row at the sides, but in two or three rows in front, and are unequally sized, some of the lateral ones being as strong as those on each side of the vomer, and much hooked, as well as partially reclining backwards. Tongue smooth, and free at the tip, which is bluntish. Pharynx armed with two patches of velutine teeth above and below. No regular barbule at the chin, but a row of minute cutaneous cirri running all round the edge of the lower jaw; a similar row along the anterior edge of the upper jaw, behind the intermaxillary, with two thicker and more conspicuous appendages of the skin in the middle. Eyes far apart, and not very large. Opercle armed with one very strong spine, but only just the point appearing through the skin.

Two small spines in front of the dorsal, a little more backward than the insertion of the pectorals, the first very minute, and hardly appearing through the skin. Second or true dorsal very long, reaching to the base of the caudal, and of nearly uniform height throughout, equalling about one-third of the greatest depth of the body; the rays branched, and the membrane notched between their tips. Anal commencing under the fifth dorsal ray, similar to that fin, but with the membrane more notched between the rays: both fins are fastened down at their extremities to the fleshy part of the tail by a membrane. Caudal slightly rounded, when spread. Pectorals broad and large, but, from the middle rays being longest, appearing somewhat wedge-shaped, not quite equalling the length of the head. Ventrals much smaller, only half their length, and cut nearly square.



Skin perfectly naked. The lines of pores, which are very numerous about the head and body, run in the exact directions laid down by Cuvier and Valenciennes, in their description of the *B. porosissimus*; but in addition to those which have been pointed out by them, there is one commencing at the nostrils, and passing underneath each eye, thence ascending a little behind the eye to descend again by the margin of the preopercle; another directed transversely across the cheek, connecting the former with the row that passes along the edge of the lower jaw: this transverse row, if continued upwards, would form a tangent to the posterior part of the orbit. All the lines of pores are furnished with very minute cutaneous appendages, similar to those already spoken of above, as fringing the edges of the jaws.

D. 2—36; A. 33; C. 12, &c.; P. 20: V. 1/2.

Length 9 inches.

COLOUR.—“Above purple-coppery; sides pearly; beneath yellowish, with silver dots in regular figures; iris coppery.”—D. The silver dots alluded to by Mr. Darwin, are the lines of pores. There are two longitudinal dark lines on the dorsal, the uppermost serving as an edging: the anal also is edged in the same manner, especially posteriorly.

Habitat, Bahia Blanca.

This species was found by Mr. Darwin cast up on the beach at Bahia Blanca, where he states that it is not uncommon. It approaches so closely the *B. porosissimus* of Cuvier and Valenciennes, that I dare not consider it as distinct without comparison. Yet it differs from their description of that species, in having four vomerine teeth, instead of two; in having six more rays in the anal fin; and in having the additional lines of pores above indicated; though these last may have been accidentally left unnoticed. It requires the examination of more specimens to determine whether these differences result from a difference in species or not.

#### FAMILY.—LABRIDÆ.

COSSYPHUS DARWINI. Jen.

PLATE XX.

*C. corpore elongato-ovali; capite grandi, fronte elevato, rostro ex hoc declivi: caninis quatuor fortibus ad apicem utriusque maxillæ, ad angulos oris nullis; dentibus lateribus conicis; interiùs, ad latera palati, granis plurimis minutis obtusis: preoperculo, limbo excepto, operculo, et interoperculo, squamatis; preoperculo margine integro: rostro, maxillis, et suborbitalibus ante oculos, nudis: lined laterali subrectâ: pinnâ dorsali parte spinosâ humili, spinis ad apices laciniatis; molli, heic respondente anali, duplè altiore, sub-acuminatâ: caudali æquali, solùm radiis exterioribus aliis paulo longioribus.*

D. 12/10; A. 3/12; C. 14, &c.; P. 17; V. 1/5.

LONG. unc. 19.

FORM.—Head large: body of a suboval form, but much elongated: greatest depth at the nape contained about four times and three quarters in the entire length: head not quite three times and three quarters in the same. Nape and forehead high, whence the profile descends obliquely in a straight line to the end of the snout. Jaws equal, and rather acute: lips fleshy: the end of the maxillary not quite reaching to a vertical line from the anterior margin of the orbit. Four very conspicuous, strong, curved, canine teeth at the anterior extremity of each jaw; those above of nearly equal length, but the two middle ones rather longer and stouter than the other two; of those below, on the contrary, the outer ones are the longest, as well as strongest, being nearly twice as much developed as the middle ones, which last are of about the same length as, but rather slenderer than, the outer ones above. The teeth at the sides of the jaw are short and conical, and not very sharp pointed, forming a regular series; below they amount to nine or ten on each side; above, the series may have been originally of the same number, but in this specimen several appear wanting. Besides these conical teeth at the sides of the jaws, there is an inner band of small rounded grains about the size of pins' heads: the band is broader, and the grains larger and more distinct above than below: many of them appear much flattened, and as if ground down by use. Eyes of moderate size; their diameter about one-seventh the length of the head; rather high in the cheeks, and nearly equidistant from the end of the snout and the posterior angle of the opercle. Snout and sub-orbital in advance of the eyes, as well as the jaws, naked. Preopercle large; occupying the posterior half of the cheek, rectangular, but the angle at bottom much rounded, the ascending margin vertical, both margins entire; covered with small scales; the limb rather broad, bounded internally by a slightly raised ridge, and without scales, but with a few scattered small pores. The opercle and subopercle form together an irregular oblong, of which the height is double the length; both are covered with scales larger than those on the preopercle: the membrane terminates behind in a blunt angle. The interopercle, which is very distinct, has three rows of scales on its surface, but none on the margin.

The lateral line is nearly straight throughout its course, the bend downwards beneath the termination of the dorsal fin being scarcely perceptible. The tubes of which it is composed are unbranched; many of them, however, incline upwards at their posterior extremity towards the back. The scales on the body are rather larger than those on the opercle: there appear to be upwards of fifty in a longitudinal line. The free portion of each scale has its surface finely granulated in the middle, and striated at the sides.

The dorsal commences rather before one-third of the entire length, excluding caudal, and occupies a space equalling nearly half the same; the spinous portion is low, and the spines of nearly the same length, the first and second only being rather shorter than the succeeding ones; the membrane between the spines notched: the soft portion rather pointed, and twice as much elevated as the spinous. The anal commences beneath the eleventh or twelfth dorsal spine, and terminates in the same vertical line with that fin; the soft portion, which answers to the soft portion of the dorsal, is preceded by three spines, increasing in length to the third, which is double the first, though itself not above half the length of the soft rays; these spines are not particularly stout. The space between the anal and caudal equals one-sixth of the whole length. Caudal rays nearly even, with the exception of the two outermost above and below, which being rather longer than the others, give the fin a slightly crescent-shaped form: the base of the caudal is scaly, but the scales advance only a very little way between



the rays. Pectorals very little in advance of the ventrals, in length more than half that of the head, with the second, third, and fourth rays longest. Ventrals in an exact vertical line with the commencement of the dorsal, nearly equal to the pectorals, with the first and second soft rays longest; the spine rather more than half the length of the first soft ray; the last soft ray united to the body by a membrane.

COLOURS.—“Centre of each scale pale vermillion red: lower jaw quite white: a large irregular patch above the pectoral bright yellow: iris red, pupil blue-black.”—D. The dried skin in its present state is of a nearly uniform brown.

Habitat, Chatham Island, Galapagos Archipelago.

I have named this species in honour of Mr. Darwin, whose researches in the Galapagos Archipelago, where he obtained it, have been so productive in bringing to light new forms. I have referred it to the genus *Cossyphus* of Valenciennes, on account of the small rounded grains behind the principal teeth; but it rather departs from that group in not having the preopercle denticulated, and in having no scales on any of the vertical fins, with the exception of a few at the base of the caudal. In some respects it seems intermediate between that genus and *Labrus*. It does not appear to be described, though it seems to approach the *C. reticulatus* of Valenciennes in many of its characters. That species however is from Japan.

The canines at the anterior extremity of each jaw are very conspicuous in this fish, and give it at first sight much the appearance of a *Dentex*.

CHEILIO RAMOSUS. Jen.

*C. nigro-fuscus, infra lineam lateralem et in ventre obscure argenteus; pinnis pallide fuscis immaculatis: corpore valde elongato: dentibus in maxilla superiore duobus anticis caninis fortibus, lateralibus conicis parvis subæqualibus; in inferiore, caninis parvis, lateralibus variis inæqualibus: linea laterali ramosa.*

B. 6; D. 9/13; A. 3/12; C. 12, et 4 breviores; P. 11; V. 1/5.

LONG. unc. 9. lin. 6.

FORM.—Very much elongated, with the dorsal and ventral lines nearly straight. Depth varying but little, and contained nine and a half times in the entire length; thickness not quite three-fourths of the depth. Head elongated, contained not more than three and a half times in the entire length, compressed, with the cheeks vertical. Snout very much produced, slightly rounded at the extremity: gape reaching half way to beneath the middle of the eye. Jaws scarcely protractile; the upper one a little the longest: lips reflexed in the form of membranaceous flaps, especially the lower one, the margin of which is sinuous. Teeth ranged in a single row in each jaw. Those above form a numerous, close-set, nearly even series at the sides of the jaw, with two long hooked canines in front; the lateral teeth amount to about thirty-five on each side, and are small, but strong, somewhat conical, and not very sharp-pointed. In the lower jaw there are two front canines, similar to those in the upper, but much smaller; then

follow four short conical teeth; then six large triangular, compressed, sharp-pointed ones, but not all of equal size; then five more small conical ones, which complete the series on each side. No teeth on the vomer or palatines. Eyes of moderate size, situate in the middle of the length of the head, high, but not touching the line of the profile; their diameter one-eighth the length of the head. Preopercle rectangular. Opercle triangular, the membrane produced posteriorly at the upper part in the form of a rounded angle: a short row of scales observable along its upper margin, and another along its lower. Subopercle and interopercle without scales. Also a short row of scales, similar to those on the opercle, behind and partially beneath each eye, and, with these exceptions, no other scales on the head. Above each eye is an irregular row of minute pores: there are also pores beneath the eye, and on the sides of the snout, mixed with short raised lines having somewhat the appearance of written characters. Gill-opening widely cleft; the branchial membrane free all round.

Scales on the body moderately large, and similar in form to those of the *C. auratus*, as described by Cuvier and Valenciennes. The number, in a longitudinal line from the gill to the caudal, is forty-six, in a vertical about seventeen. Lateral line also as in that species, but with the mucous tubes branched, and giving off eight or nine twigs on each side.

The dorsal commences a little behind the terminating angle of the opercle, and the anal immediately beneath the first branched ray of the dorsal: these fins terminate in the same vertical line, and the last ray in each is double: the simple rays are soft and flexible. Caudal slightly rounded. Pectorals short, and obliquely truncated, contained eleven and a half times in the entire length. Ventrals very small, about two-thirds the length of the pectorals, rounded, close together, with an elongated scale between them; their point of insertion slightly backward than that of the pectorals.

COLOUR.—Not noticed in the recent state. In spirits, it appears of an almost uniform dark brown, at least above the lateral line. There is some trace of a pale longitudinal band on each side of the head beneath the eye, which is continued, but rather indistinctly, along the whole length of the body, the tips of the scales remaining dark. Possibly during life all the lower part of the sides and belly may have exhibited numerous dark spots upon a pale or silvery ground. Under part of the head pale brown, with some faintly-defined ocellated spots: also a faint trace of red on the opercle. All the fins pale brown, without spots.

Habitat, Japan?

This species was given to Mr. Darwin, when at Chiloe, by the surgeon of a whaling-ship, who said that he believed that it was caught in the Japan seas. From the great similarity which prevails amongst the species of this genus, I am not sure that it is really new, as I have ventured to consider it. The specific character also, so far as the colours are concerned, must be received with some caution, in consequence of these last not having been observed in the recent state. It seems to approach very closely the *C. hemichrysos* of Cuvier and Valenciennes, brought by MM. Quoy and Gaimard from the Sandwich Islands; but it differs in its colours, especially in the fins being all uniformly pale brown, and in having fewer scales on the opercle, and beneath the eye. It is impossible



to say, however, to what extent the colours may have been altered by the spirit: some of the scales also may have been rubbed off.

CHROMIS FACETUS. *Jen.*

*C. supra virescenti-niger, lateribus pallidioribus: dorso modice arcuato; fronte elevato, rostro summo ante oculos paululum excavato: limbo preoperculi poris quatuor conspicuis impresso: squamis latis, marginibus liberis levissime ciliatis: spinis dorsalibus quindecim, analibus sex: pinnis ventralibus longe acuminatis, ad analem pertingentibus: pinnâ caudali subæquali.*

D. 15/10; A. 6/8; C. 16, &c.; P. 14; V. 1/5.

LONG. unc. 5. lin. 9.

FORM.—Oblong-oval, very much compressed; the back moderately elevated, and more curved than the abdomen. Greatest depth a little behind the insertion of the pectorals, and contained twice and three-quarters in the entire length: thickness about two-fifths of the depth. Fore-head high: profile falling very obliquely, and slightly hollowed out in front of the eyes; the upper and under profile meeting at the mouth at nearly a right angle. Head contained not quite four times in the entire length; its own length and height nearly equal. Mouth small, protractile: jaws about equal, the lower one, if anything, a little the longest: lips not very fleshy. Maxillary rather slender, retiring almost entirely, when the mouth is closed, beneath the sub-orbital, the anterior margin of which is slightly hollowed out, and somewhat sinuous. Teeth in card in both jaws, forming a narrow band; the outermost row longer and stronger than the others, especially the four or six middle ones in front, which are somewhat conical and slightly hooked. Pharyngean teeth present, but none on the vomer or palatines. Eyes rather small, their diameter about one-fifth the length of the head; high in the cheeks, and a little nearer to the snout than to the posterior margin of the opercle: the space between broad, equalling nearly two diameters and-a-half. Nostrils consisting of a single round orifice half-way between the eye and the end of the snout. Preopercle with the basal margin short, and forming a slightly obtuse angle with the ascending one, the margin of which is entire. Opercle of a triangular form, broad at top, but narrowing off towards the bottom. Subopercle and interopercle much developed; their outer margins, taken together, rounded off nearly in a semicircle. Branchial membrane quite free all round, unattached to the isthmus, and but slightly emarginate. Snout, suborbital, jaws, and limb of the preopercle, naked; but the cheeks and rest of the opercular pieces scaly: the scales on the subopercle large. Four large pores on the limb of the preopercle, preceded by three others beneath the lower jaw: similar pores beneath the eye, and extending partially round it; one on the crown of the head, and a few smaller ones scattered about the snout; a large one just above the opercle, and another higher up on each side of the nape.

Scales on the body large; about twenty-five or twenty-six in a longitudinal row, and eleven or twelve in the depth; broader than long, with the free edges very minutely ciliated, the concealed portions with a fan of thirteen striæ, and the basal margins with twelve distinct

crenatures. Lateral line interrupted; its first portion at the depth of two and a half rows of scales beneath the dorsal, and stopping beneath the commencement of the soft part of that fin; recommencing three rows lower down, exactly in the middle of the depth, whence it runs straight to the caudal.

Dorsal commencing above the opercle; the spinous portion of nearly uniform height, and scarcely more than one-fifth of the depth; the soft portion much higher, and terminating in a sharp point behind. Anal answering to the posterior half of the dorsal, terminating opposite to it, and similarly pointed; with six spines, which, as well as the dorsal spines, are furnished with very conspicuous filamentous tags. Caudal nearly even. Pectorals rounded, but not very broad, their length rather more than three-fourths that of the head; the rays rather slender. Ventrals pointed; the first soft ray elongated, and reaching to the anal when laid back; the last ray attached at its base by a membrane to the abdomen. Rows of small scales between the rays of the caudal at the base of the fin; and a few small ones along the base of the dorsal and anal, more particularly on the soft portions.

COLOUR.—“Above, greenish black; the sides paler; slightly iridescent.”—D.—In spirits it appears of a nearly uniform brown all over, fins included.

Habitat, Maldonado, Rio Plata.

Mr. Darwin obtained this species at Maldonado, in a lake of fresh water, said sometimes to be a little brackish. It appears to belong to the genus *Chromis* of Cuvier, placed by him amongst the *Labridæ*, but having evidently very strong affinities to some of the *Sciænidæ*. It differs essentially from the *C. Brasiliensis* of Quoy and Gaimard,\* in having six anal spines, and being destitute of all markings and spots. I am not aware that it is described by any author.

1. SCARUS CHLORODON. *Jen.*

PLATE XXI.

*S. æruginoso cyaneus, capite et pinnis flavo-vittatis: maxillis externis lævibus, marginibus crenatis; caninis ad angulos oris nullis: fronte gradatim proclivi: lineâ laterali tubis parum ramosis: squamis ubique striato-granulatis: pectoralibus acuminatis, radiis superioribus arcuatis: caudali radiis externis cæteris longioribus, acuminatis.*

D. 9/10; A. 3/9; C. 13. &c.; P. 15 vel 16; V. 1/5.

LONG. unc. 16.

FORM.—Of an oval form; the greatest depth one-third of the length, caudal excluded: dorsal and ventral lines equally convex. Head a little less than the depth of the body, not gibbous in front, but with the profile falling regularly and gradually from the commencement of the dorsal. Snout rather pointed. Jaws equal, their outer surface smooth, but crenated on their cutting edges. No spinous canines at the corners of the mouth. Eyes rather small, their diameter not one-fifth the length of the head, situate above the middle of the cheek, but equidistant from the posterior lobe of the opercle and the extremity of the snout. Snout in front of the eyes, and

\* Freycinet Voyage, (Zoologie) p. 286.



the lips, naked; but the cheeks and opercular pieces covered with large scales, which form two rows on the cheeks. Opercle terminating behind in a rounded angle. Scales on the body very large; eight in the depth, and twenty-one or twenty-two in the length: the entire exposed portion of each scale scabrous with granulations, which are partially disposed in lines towards the free edges. No scales on the vertical fins. The lateral line occupies the second row of scales from the top, till it reaches a little beyond the end of the dorsal, where it becomes interrupted, recommencing in the fourth row, which at this point is the third: tubal pores in some places ramified, but the ramifications not very distinct.

The dorsal commences above the posterior lobe of the opercle, and is of nearly uniform height throughout. The length of the rays in the soft portion, which is slightly higher than the spinous, is not quite one-third of the depth. The whole length of this fin is half the entire length. The anal answers to the last half of the dorsal, and terminates in the same line; the three spines are slender, and the first very short. Caudal with the central portion slightly convex, but the three outer rays above and below prolonged into a point one-third the length of the whole fin; the lower point a little longer than the upper. Pectorals about one-fifth of the entire length, pointed, with the upper rays arcuate. Ventrals immediately beneath them, one-third shorter.

COLOUR.—“Fine verditer blue, with some yellow stripes about the head and fins.”—D.—The dried skin is nearly of a uniform brown, but the snout and cheeks are much varied with green: the jaws also are green. A bright green patch in front of the eye, immediately beneath which is a pale frænum, probably yellow in the recent state. Dorsal and anal green: the former shews some trace of a lighter narrow band running longitudinally below the upper edge of the fin; the latter exhibits a very distinct fascia running along the middle. Caudal pale green, with the upper and lower edges of a much deeper tint. Ventrals in like manner edged with green. Pectorals wholly dusky.

Habitat, Keeling Island, Indian Ocean.

In so extensive a genus as the present, and one in which so much general similarity prevails amongst the species, the task of determining whether any particular one has been described before is extremely difficult. I can only say that the species which I have here ventured to characterize as new has been carefully compared with the descriptions of all those noticed in the “*Histoire des Poissons*,” and though there are several to which it is nearly allied, there is none to which it can be referred with certainty. It seems to approach nearest the *S. variegatus*, but that species is said to have the caudal square, by which I presume is meant that the upper and under rays are not prolonged into a point, as is the case in so many species of this genus, and in the one here described.

This species was taken by Mr. Darwin at the Keeling Islands.

## 2. SCARUS GLOBICEPS. *Cuv. et Val.*

*S. globiceps*, *Cuv. et Val.* Hist. des Poiss. tom. xiv. p. 179.

FORM.—Oblong-oval, very much compressed throughout: the dorsal and ventral lines nearly of equal curvature. Greatest depth contained about three times and one-third in the entire

length: thickness twice and three-fifths in the depth. Head one-fourth of the entire length, rather elevated at the nape, the forehead convex, whence the profile descends nearly in the arc of a circle, giving the snout a blunt and rounded appearance. The height of the head, taken in a vertical line through the eyes, equals nearly but not quite its own length. Mouth small, the gape not reaching half-way to the eye. Jaws very slightly crenated on their cutting edges, the true teeth appearing on the outer surface like minute scales. At the posterior angle of each jaw, and on each side, are two sharp canines projecting horizontally from the corners of the mouth, eight in all. Eyes rather small, their diameter contained six-and-a-half times in the length of the head, situate a little above the middle of the cheek, and a trifle nearer the extremity of the snout than the posterior margin of the opercle. The nostrils consist of two minute orifices a little in advance of the eye, and a little distant from each other, the posterior one largest and kidney-shaped, the anterior round and nearly closed by its membranous border. A cluster of minute pores above and behind the eyes, and a few others scattered about the snout.

Scales on the body very large, increasing in size at the base of the caudal, where there are three very large ones covering the rays of that fin for half their length or more: twenty-three in a longitudinal line, and nine in the depth. Each scale of a roundish form anteriorly, the basal portion with a projecting lobe in the middle of the hinder margin, and with thirty-one striæ in the fan; the exposed portion finely striated and granulated, with a broad membranaceous border: those on the caudal nearly three times as long as broad, but the ordinary ones with the length and breadth nearly equal. Lateral line interrupted; the upper portion running nearly straight at about one-fourth of the depth, till opposite the end of the dorsal, where it inclines downwards: tubal pores very distinctly ramified.

Dorsal very low, its height, in the middle of its length, being scarcely more than one-eighth of the depth: the soft rays slightly higher than the spinous, and increasing in length backwards. Anal answering to the last half of the dorsal, and terminating in the same line: three spines at its commencement not stouter than the soft rays, the first very small. The last soft ray in both dorsal and anal double. Caudal with the points about one-fourth of the rest of its length; when spread, the interval is rectilineal, but when the rays are closed the whole appears crescent-shaped. Pectorals a little shorter than the head, of a somewhat triangular form, the rays gradually decreasing in length from the uppermost to the lowermost. Ventrals pointed, about two-thirds the length of the pectorals, and immediately beneath them. A large oblong lanceolate scale between the ventrals, nearly half their length: also an oblong scale in the axilla of each, equalling the last of the soft rays.

D. 9/10; A. 3/9; C. 13, &c.; P. 13; V. 1/5.

Length 11 inches.

COLOUR.—Not noticed in the recent state. In spirits, it appears bluish grey on the back and sides with small round whitish spots, the margin of each scale being defined by a purplish line; paler on the belly: a white transverse line in front of the eyes passing from one to the other; anterior part of the snout, mouth, cheeks, and lower part of the head, yellowish white. Dorsal and anal pale, the former with three narrow longitudinal purplish lines, the latter with one. A portion of the under surface of the pectorals, extending from the third to the fifth ray, and



forming a longitudinal fascia, purple; the rest of those fins, as well as the caudal and ventrals, pale or nearly colourless.

Habitat, Tahiti.

This species was taken by Mr. Darwin at Tahiti. It so nearly answers to the description of the *S. globiceps* of Valenciennes, brought by MM. Garnot and Lesson from the same locality, that I cannot suppose it to be distinct. This specimen, however, appears to have more spinous teeth at the corners of the mouth.

### 3. SCARUS LEPIDUS. Jen.

*S. fuscus, capite et pinnis purpureo-cæruleo tinctis: fronte parum elevato, æque ac rostro continue et gradatim proclivi; hoc apice obtuso: maxillis exterius lævibus, marginibus vix crenatis; canino ad angulum oris in maxillâ inferiore unico, in superiore nullo: lineâ laterali distinctè ramosâ: pectoralibus subtriangulis: caudali subæquali, radiis externis mediis vix longioribus.*

D. 9/10; A. 3/9; C. 13, &c.; P. 13; V. 1/5.

LONG. unc. 8. lin. 7.

FORM.—General form not very dissimilar to that of the last species, but the crown and nape less elevated, whence the profile falls in a more gradual slope: snout, nevertheless, blunt at the extremity. Depth of the body very nearly one-third of the entire length. Head about one-fourth of the same. The height of the head is about four-fifths of its own length. Jaws smooth externally, the true teeth appearing like minute scales on their surface, the cutting edges scarcely at all crenated: only one laterally projecting canine at each corner of the lower jaw, none in the upper. Diameter of the eye one-sixth of the head.

Dorsal not quite so low as in the last species; its height in the middle of its length about one-seventh of the depth. Caudal nearly even, the upper and lower rays being scarcely longer than the others. Pectorals and ventrals similar, but the scale between the latter shorter and more rounded. Scales on the body large, the free portions finely striated and granulated, with a broad membranaceous border: three large ones at the base of the caudal, as in the last species. Lateral line distinctly branched, the ramifications irregular and varying on each scale; in some instances only one long stem extending nearly to the margin of the scale, with one or more lateral twigs; in others, two, three, or even four distinct stems, either simple or ramified.

COLOUR.—(*In spirits.*) Of a nearly uniform dark brown, with some faint traces of purplish blue about the head and fins, which possibly may have pervaded some parts of the body also in the recent state.

Habitat, Tahiti.

This species was taken with the last, and notwithstanding it presents two or three obvious differences in respect of form, as well as of colour, it is just possible it may be the same in a younger state. I think it not improbable that the points of the caudal may elongate with age, the forehead become more gibbous, and the

spinous teeth more numerous. If it be distinct it would seem to be undescribed; though the colours not having been noticed in the recent state renders it difficult to speak with certainty on this point. For the same reason, the specific character may perhaps hereafter be found to require alteration.

### 4. SCARUS ——— ?

Mr. Darwin's collection contains another species of *Scarus* from the Keeling Islands, which may probably be distinct from all those hitherto noticed, but which being in rather a bad state of preservation, I shall content myself with describing as well as I can, without affixing any name to it, lest in the end it prove not new. Many of the species enumerated in the "Histoire des Poissons" having only their colours noticed, it requires that these should have been observed more in detail than what Mr. Darwin's notes furnish in this instance, in order to decide whether it be identical or not with any of those spoken of in that work.

FORM.—A tolerably regular oval, somewhat attenuated at each extremity: dorsal and ventral lines of equal curvature. Nape not at all elevated, and the profile on the whole falling very regularly and gradually from thence to the end of the snout, though there is a slight eminence on the forehead. Depth one-fourth of the entire length. Jaws smooth externally, but with the true teeth very distinct upon their surface, and much more so upon their cutting edges than in either of the last two species. One horizontally projecting canine at each corner of the upper jaw, but none in the lower. The terminating lobe of the opercle is slightly emarginated behind, the membrane projecting immediately above the notch in the form of a short salient point. Lateral line interrupted, the upper portion nearly straight, and not inclining downwards at its posterior extremity: the tubes very slightly ramified, and many of them quite simple. The scales on the body are very finely granulated and striated: there are no large ones at the base of the caudal. Dorsal and anal low: height of the former contained four and a half times in the depth of the body, and exactly equalling the distance from the upper edge of the back to the lateral line. Pectorals somewhat triangular, the uppermost ray of all a little arcuate. Scale between the ventrals one-third the length of those fins. Caudal slightly crescent-shaped, when the rays are closed: when spread, all the middle rays appear even, the uppermost and lowermost projecting very slightly beyond them.

D. 9/10; A. 3/9; C. 13, &c.; P. 14; V. 1/5.

Length 6 inches.

COLOUR.—"Body dull reddish and greenish, the colours being blended and mottled: fins banded lengthwise with vermilion-red: head with waving bright green lines."—D.—No trace of bright colours remains in its present state, and the only indication of markings is a narrow crescent-shaped band across the middle of the caudal.



## MALACOPTERYGII.

## FAMILY. SILURIDÆ.

## 1. PIMELODUS GRACILIS. Val.

*Pimelodus gracilis*, Val. in D'Orb. Voy. dans l'Amer. Mérid. Atl. Ichth. Pl. 2. fig. 5.  
Cuv. et Val. Hist. des Poiss. tom. xv. p. 134.

FORM.—Of a slender elongated form, the body compressed behind the dorsal. Greatest depth contained about seven and a half times in the entire length: thickness at the commencement of the dorsal a little less than the depth. Head, measured to the gill-opening, rather more than one-sixth of the entire length: its breadth two-thirds of its own length. Helmet smooth, and not very conspicuous, though with its whole surface finely wrinkled: its breadth behind the eyes rather more than one-third of its length, measuring this last from the end of the snout to the further extremity of the interparietal process. The solution of continuity extends back nearly to the base of the process just mentioned, which last is narrow and lanceolate, three times as long as broad at its base, but not reaching to the buckler, or triangular plate in front of the dorsal, by one-third of its own length. The buckler itself is not very large, but sufficiently obvious.

Profile sloping gradually downwards in nearly a straight line from the beginning of the dorsal to the end of the snout: this last depressed and rounded horizontally in the form of a semicircle. Mouth wide, but very little cleft, the commissure not reaching half way to the eye. Upper jaw projecting a very little beyond the lower. In each a band of very fine velutine teeth; but none on the vomer or palatines. Tongue smooth, and fastened down all round. Six barbules; the maxillary pair very long, reaching to the commencement of the anal fin; of the submandibular pairs, the exterior reach one-third beyond the insertion of the pectorals; the interior are only half the length of the exterior. Eyes round, of moderate size, their diameter four and a half times in the length of the head, situate in about the middle of the length: distance from one to the other one diameter and a quarter. Lateral line nearly straight throughout its course, dividing the body longitudinally into two nearly equal portions.

Pectorals not quite equalling the length of the head, and a little less than one-sixth of the entire length: the spine very little shorter than the soft rays, very strong, with sharp teeth on its inner edge, but the outer edge only granulated, or with a few slight serratures towards the extremity. The humeral bone seen above the pectoral projects backwards in the form of a spinous lamina, but does not appear through the skin; it equals half the length of the pectoral itself. The dorsal commences at one-fourth of the entire length, and is of a somewhat rectangular form, the soft rays not decreasing much backwards: its length equals four-fifths of the depth of the body, and two-thirds of its own height. The spine is not so strong as that of the pectoral, and with only a few small serratures on the outer edge near the tip. The space between the dorsal and the adipose a little exceeds the length of the former. The adipose

itself is twice the length of that fin; very low at first, but gradually rising, until, before its termination, it becomes equal to between one-half and one-third of the depth. The vent is in the middle of the entire length, caudal excluded. Anal short, and just beneath the middle of the adipose, there being about one-fourth of this last fin in advance of it as well as behind it: the first four rays simple, but apparently all articulated, the first two or three very minute and not easily observed. Caudal forked for two-thirds of its length: the upper lobe a little longer than the lower, and contained five and a half times in the entire length. Ventrals immediately beneath the last ray of the dorsal; a little shorter than the pectorals, and not reaching to the anal by half their own length.

D. 1/6; A. 14 or 15; C. 17, &c.; P. 1/9; V. 6.

Length 5 inches 2 lines.

COLOUR—(In spirits.) Brownish, inclining to silvery in some places: a dusky fascia formed of dots along the lateral line. Dorsal rather dusky at the base, and with the upper portion also dusky between the rays: a dusky spot on the anterior part of the adipose.

Habitat, Rio de Janeiro.

This species was taken by Mr. Darwin in a running brook at Rio de Janeiro. It approaches on the whole so nearly the *P. gracilis* of D'Orbigny, that I can hardly suppose it to be distinct. Yet there are some slight differences observable in this specimen. It has more anal rays; the adipose appears shorter; and the upper lobe of the caudal is not so prolonged, though possibly it may be worn down. Also D'Orbigny's figure appears to want the dusky stains on the dorsal and adipose fins. If it be not that species it must be new, as there is none other described by Cuvier and Valenciennes with which it will assimilate better.

## 2. PIMELODUS EXSUDANS. Jen.

*P. corpore parum elongato, altitudine quintam partem longitudinis æquante: galeâ lævi, inconspicuâ, processu interparietali haud clypeum parvum prædorsalem attingente: poris paucis buccalibus amplis, serie obliquâ dispositis: maxillis æqualibus: cirris sex; maxillaribus haud analem attingentibus: lineâ laterali primum deflexâ, deinde rectâ: pinnis dorsali et anali brevibus; adiposâ dorsali haud duplo longiore: caudali profundè bifurcâ, lobis æqualibus: spinâ pectorali margine interno fortiter dentato.*

D. 1/7; A. 13 vel 14; C. 17, &c.; P. 1/8; V. 6.

LONG. unc. 3. lin. 6.

FORM.—In some respects resembling the last species, but the body much less elongated, the depth and thickness remaining the same. The depth is about one-fifth of the entire length; the head rather more than one-fifth. The helmet is scarcely so much wrinkled, and the interparietal process not so long, reaching only half-way to the buckler, which last is smaller and less obvious. The solution of continuity of the bones of the cranium appears to extend back



in the form of a narrow fissure nearly to the base of the interparietal process, but is not very obvious, except between the eyes, where it opens into a sort of elongated ellipse. There are eight or nine pores on the top of the head, rather behind the eyes, so arranged as to form nearly a complete circle. There is also a very conspicuous row of three or four large oval pores on the cheek, at the anterior part of the opercle, descending obliquely forwards: other smaller ones may be seen scattered about different parts of the head. The jaws are equal: the teeth as in the last species, excepting that a roughness can be distinctly felt upon the vomer beneath the skin, though there are no teeth on that part which appear through it. The maxillary pair of barbules reach to a point midway between the insertion of the ventrals and the commencement of the anal: of the submandibular pairs, the exterior do not reach beyond the insertion of the pectorals; the interior are two-thirds the length of these. Eyes elliptical, the longitudinal diameter about one-fifth the length of the head; situate nearer the end of the snout than the posterior part of the opercle; the interval between them nearly two diameters. The lateral line slopes downward till opposite the fourth soft ray of the dorsal, then passes off straight along the middle to the caudal.

The pectorals are contained about five-and-a-half times in the entire length. The spine is similar to that of the last species; but the humeral bone is shorter, and scarcely one-third of the pectoral itself. The dorsal is similar; and the space between it and the adipose is the same; but the adipose itself, though of the same form, is not so long, from the body being less elongated; it is not more than half as long again as the dorsal. Anal similar, but the adipose not advancing so much beyond it. Caudal and ventrals similar; but the former with the lobes equal.

COLOUR.—(*In spirits.*) On the whole similar to, but darker than that of the last species. There is some appearance of a fascia along the lateral line. The upper part of the dorsal, and also of the anal, is dusky, but there is no spot on the adipose. Pectorals and ventrals dusky.

A second specimen differs from the above in no respect, except in being smaller, measuring two inches and a quarter in length, and in having one ray more in the anal.

Habitat, Rio de Janeiro?

The number annexed to this species has been lost, but there is reason for believing that Mr. Darwin took it with the last at Rio de Janeiro. I cannot identify it with any of those described by Cuvier and Valenciennes in the "*Histoire des Poissons*."—It affords another instance of the indefiniteness of the character derived from the presence or absence of vomerine teeth; since a band of such teeth, which are considered by Valenciennes as absent in this genus, can be distinctly felt and made obvious by removing the skin of the palate, though they do not appear externally. This is not the case with the species last described, to which nevertheless, the present one approaches so closely in general character, that they never could be widely separated. Except for the greater elongation of the body in the *P. gracilis*, I should have been almost inclined to consider them as sexes of the same species.

CALLICHTHYS PALEATUS. *Jen.*

*C. capite compresso lavi: ore parvo, cirris maxillaribus ad utrumque angulum duobus, haud ultra oculos pertingentibus; labro inferiore reflexo, et in duos cirros breves membranaceos producto: spinâ pectorali compressâ, forti, margine interno leviter dentato, externo lavi, quintam partem totius longitudinis æquanti: caudali bifurcâ, lobis æqualibus acuminatis.*

D. 17—1; A. 6; C. 14, &c.; P. 17; V. 6.

LONG. unc. 1. lin. 10.

FORM.—General form resembling that of the *C. punctatus*. Depth, at the commencement of the dorsal, one-third of the length, excluding caudal: thickness at the pectorals three-fourths of the depth. Head slightly compressed, its height very little less than its length, this last, measured to the gills, being rather less than one-fourth of the entire length. Profile falling from the dorsal in one regular slope, and nearly rectilinear till it arrives before the eyes, where it curves downwards, making the extremity of the snout obtuse. Mouth small, the upper jaw a little projecting; two maxillary cirri at each angle; these nearly equal; the lower one a little the longest, reaching to beneath the middle of the eye: also two short cirri, only half the length of the maxillary ones, pendent from the reflexed lower lip, a little separate from each other, one on each side the middle. Teeth so minute as hardly to be distinguished; a row can just be felt on each jaw, and on the vomer. Head smooth. The number of dorsal laminae twenty-one; that of the ventral twenty.

Pectorals a little exceeding the length of the head; the spine nearly as long as the fin itself, but not exceeding one-fifth of the entire length; very strong, compressed, and sharp-pointed, with a few fine teeth or serratures on the inner margin, but smooth on the outer. Height of the dorsal more than half the depth, and a little more than its own length, this last equalling the space between it and the adipose: the spine strong, and similar to that of the pectoral. Anal directly underneath the adipose, and hardly occupying more space. Ventrals shorter than the pectorals, attached beneath the last third of those fins, or under the second soft ray in the dorsal, and scarcely reaching more than half-way to the anal: the first ray, as well as that of the anal, somewhat hispid. Caudal forked for half its length, which about equals that of the head: the lobes equal and pointed.

COLOUR.—(*In spirits.*) General colour yellowish-brown, with dusky spots and mottlings: breast and edge of the abdomen whitish. Pectorals, ventrals, and anal, almost wholly dusky: dorsal and caudal spotted.

This species, in its general character, approaches so extremely near the *C. punctatus* of Valenciennes, that perhaps I am in error in considering it distinct. But it is remarkable for possessing, in addition to the four usual maxillary cirri, two labial, which are neither represented in D'Orbigny's figure,\* nor noticed in the description given in the "*Histoire des Poissons*," and which therefore I infer are not present in that species, as they could hardly have been overlooked, or been deemed unimportant to be noticed. The maxillary cirri also, which in the *C. punctatus*,

\* *Voy. dans L'Amér. Mérid. Atl. Ichth. pl. 5. fig. 1.*



reach, according to Valenciennes, to the gill-opening, if not beyond it, here only attain to beneath the middle of the eye; and this character is invariable in five specimens which Mr. Darwin has brought home. Judging from the description, there would seem to be one or two further differences: the profile appears to be more rectilineal, the pectoral spine shorter, and smoother on its external margin. The colours are on the whole similar, but the pectorals and ventrals darker: the latter, which are said to be yellow in the *C. punctatus*, are here quite dusky in every one of the specimens.

The exact locality in South America in which Mr. Darwin obtained this species is uncertain, as the specimens have lost their attached labels.

#### FAMILY.—CYPRINIDÆ.

##### 1. *PÆCILIA UNIMACULATA*. Val.

*Pæcilia unimaculata*, Val. in Humb. Zool. et Anat. Comp. vol. ii. p. 158. pl. 51. fig. 2.

FORM.—Body oval, slightly elongated, thick anteriorly, compressed behind. The dorsal and ventral lines meeting at the mouth at an acute angle; but the head, when viewed from above, broad, and very much flattened between the eyes, and the snout obtuse. Greatest depth about one-fourth of the entire length: thickness two-thirds of the depth. Length of the head nearly equalling, or a little less than, the depth of the body. Mouth small: jaws very protractile; each with a single row of very fine, close-set, pointed teeth; the lower one a trifle the longest. Eyes large, their diameter three and a half times in the length of the head, high in the cheeks, reaching to the line of the profile. Nostrils consisting of one small orifice a little above and rather in advance of the eyes.

Scales large, investing the head and all the pieces of the gill-cover, though very thin and transparent on the opercle and not very obvious there. On the body there are about eight in the depth, and twenty-seven or twenty-eight in a longitudinal row from the gill-opening to the caudal. One taken from the middle of the side found to be of a semi-elliptic form, the exposed portion marked with numerous very fine curved concentric lines, the basal with sixteen or seventeen deeper-cut nearly parallel striæ gradually lengthening from the sides towards the middle, but not converging to a fan. Lateral line very faintly marked out by a dotted line, scarcely obvious in some places.

Dorsal small, commencing exactly at the middle point of the entire length, measuring this last quite to the extremity of the caudal. Anal similar and opposite; in strictness, however, terminating a very little in advance. The last ray in both these fins double: the first two in the anal short. Caudal rounded. Pectorals and ventrals small and narrow, the former three-fourths the length of the head; the latter not above half the same. The pectorals, when laid back, reach to the insertion of the ventrals, but the ventrals hardly reach to the commencement of the anal.

B. 5; D. 7; A. 9; C. about 24, including short ones; P. 14 or 15; V. 6.

Length 2 inches.

COLOUR.—Greenish-brown, with a conspicuous black spot on the middle of each side, a little in advance of the commencement of the dorsal. Dorsal a little dotted and mottled with dusky, especially towards the tips of the rays. The other fins plain.

Habitat, Rio de Janeiro.

This species, which was discovered by Humboldt, was observed by Mr. Darwin in great numbers in fresh-water ditches at Rio de Janeiro: others were taken in equal plenty in a salt lagoon. The bellies of the females are very turgid when big with young, which are said to be excluded alive, and yellowish.—Valenciennes, in his description, speaks of the opercle as being smooth, or without scales, though he says the preopercle is covered with scales; and he would lead one to suppose that they are absent on this part in the whole genus, as it enters into his generic character; I find them, however, present, though very thin and transparent, both in this species and the next.

The general resemblance which *Pæcilia* bears to *Mugil*, as regards the form of the head and mouth, is very striking, and calls up irresistibly the idea of some relation of analogy between these two genera.

##### 2. *PÆCILIA DECEM-MACULATA*. Jen.

PLATE XXII. Fig. 1.

*P. corpore sub-elongato, viridescenti-fusco; lateribus maculis nigris circiter decem serie longitudinali dispositis; pinnis immaculatis: dentibus subincisivis: caudali subtruncatâ.*

D. 8; A. 10; C. 22, brevibus inclusis; P. 9; V. 5.

LONG. unc. 1. lin. 4.

FORM.—More elongated than the last species; the snout not so acute when viewed laterally.

Depth not more than one-fifth of the entire length, the length of the head being equal to it. Mouth and jaws similar; the teeth also in one row in each jaw, and forming a compact series, but more incisor-like than pointed, with oblique cutting edges. Scales of a different form and sculpture; more oblong than semi-elliptical, broader than long; the deep striæ behind more numerous, amounting to twenty or more, and all drawn nearly of the same length. They cover all the pieces of the opercle as in the *P. unimaculata*.

Dorsal and anal exactly opposite, commencing at a point a little anterior to the middle of the entire length, reckoning this to the extremity of the caudal. Caudal rather more approaching to square than rounded; the number of rays fewer than in the last species. Pectorals narrower, having also fewer rays. Ventrals very small, scarcely more than half the length of the pectorals. When laid back, the pectorals reach to beyond the insertion of the ventrals: the ventrals do not attain to the anal.

COLOUR.—Greenish-brown, with about ten conspicuous somewhat oval-shaped dusky spots, arranged in a longitudinal line along the middle of each side. All the fins plain.

Habitat, Maldonado.

This, which is evidently a new species of *Pæcilia*, was taken by Mr. Darwin



at Maldonado, in a lake that had been suddenly drained. There are three specimens in the collection, none of them exceeding the length above given. Mr. Darwin, however, states in his notes, that he believes them to be full grown, having taken them so repeatedly, in brooks, of the same size. The number of spots varies from nine to twelve, and is sometimes different on the two sides of the same specimen.

Independently of the spots, which at once characterize this species, it is readily distinguished from the last by its teeth, which are more cutting than pointed, and in this respect rather departing from the character of the genus as established by Valenciennes.

1. *LEBIAS LINEATA*. Jen.

PLATE XXII. Fig. 2.

*L. corpore subelongato, subcompresso, viridescenti-fusco; lateribus lineis circiter septem longitudinalibus nigris, e maculis parvis subconfluentibus formatis: dentibus uniseriatis: caudali rotundatâ.*

D. 9; A. 9; C. 26, brevibus inclusis; P. 13; V. 6.

LONG. unc. 1. lin. 10.

FORM.—General form very similar to that of the *Pacilia decem-maculata*. Slightly compressed; the depth one-fifth of the length; the length of the head about four-and-a-half times in the same. Head depressed: snout obtuse: mouth small; the commissure horizontal. Upper jaw very protractile; the lower one rather the longest, when the mouth is shut. Teeth forming a single closely-set series, somewhat compressed at bottom, the cutting edges tricuspid. Diameter of the eye nearly one-fourth the length of the head. Some large conspicuous pores on the lower jaw, passing upwards in a series along the margin of the preopercle, not very near together, about eight or nine in all.

Scales large, covering the head and all the pieces of the gill cover, as well as the body. About eight in the depth, and thirty in a longitudinal line from the gill to the caudal. One taken from the middle of the side of a semi-elliptic somewhat oblong form; the free portion very finely striated, the basal with ten or twelve deeper-cut striae, these last nearly parallel, and of equal lengths. Lateral line faintly marked out by a dotted line; the first half in the third row of scales from the top, the last half in the fourth row.

Dorsal commencing at exactly the middle point of the entire length. Anal opposite and similar. Caudal rounded. Pectorals small, about two-thirds the length of the head. Ventrals smaller, barely one-half of the same. The pectorals, when laid back, reach to the insertion of the ventrals; but the latter hardly attain to the anal.

COLOUR.—Greenish-brown, with six or seven longitudinal dark lines on the sides, the lines apparently made up of spots for the most part confluent, but here and there not so, interrupting the continuity of the lines. All the fins pale dusky, without any spots or markings.

Habitat, Maldonado.

This new species of *Lebias* was taken by Mr. Darwin in the same lake at

Maldonado with the *Pacilia decem-maculata*. There are several specimens in the collection, none of them exceeding the size above mentioned, and they have all the appearance of being full grown. Some have the lines of spots much more interrupted than others.

2. *LEBIAS MULTIDENTATA*. Jen.

PLATE XXII. Fig. 3.

*L. corpore subelongato, subcompresso, viridescenti-fusco; lateribus fasciis angustis paucis longitudinalibus albidis obscurioribus: dentibus seriebus plurimis dispositis, omnibus tricuspidatis: caudali rotundatâ.*

D. 9; A. 9; C. 26, brevibus inclusis; P. 13; V. 6.

LONG. unc. 3. lin. 2.

FORM.—The general form and proportions of this species are extremely similar to those of the last; but it differs very remarkably in having behind the anterior row of tricuspid teeth, a band of minuter teeth above and below, all of which are also tricuspid, and similarly formed to those in front. Head one-fifth of the entire length; flattened on the crown. Jaws nearly equal; upper one very protractile. Scales large; about thirty-two in a longitudinal line, and eight in the depth; covering all the pieces of the opercle; similar in form to those of the last species, but with the striae on the free portion finer and more numerous, the deep-cut basal striae also rather more numerous, amounting to about fourteen, and of unequal lengths, gradually increasing from the outermost to the middle ones. Lateral line similar; also the same pores on the lower jaw. Fins and fin-ray-formula similar: in both species the first and last rays of the dorsal and anal are simple, and shorter than the others. The anal perhaps terminates a little nearer the caudal than the dorsal does.

COLOUR.—(In spirits.) Greenish-brown, with very little appearance of markings in its present state. There is, however, some indication of an irregular scattered row of small black spots on each side, a little below the ridge of the back; also of two or three pale longitudinal narrow bands along the middle of the sides, which were probably more conspicuous in the living fish. The belly is yellow, and very tumid; but these are evidently characters merely indicative of the female sex.

Habitat, Monte Video.

This is another new species of *Lebias* taken by Mr. Darwin in fresh-water at Monte Video, if indeed it strictly belong to the genus; but the circumstance of the teeth being in several rows, and in fact forming a complete band, is at variance with the generic characters as given by Cuvier. The teeth however being exactly of the same form as in the other species, and the general characters on the whole similar, I have not thought it expedient to erect it into a new genus. There is but one specimen in the collection, which appears to be a large female big with young.



GENUS—MESITES. *Jen.*

*Corpus elongatum, gracile, antice subcylindricum, postice compressum, nudum, squamis nullis. Caput depressum. Rostrum breve, obtusum: os terminale, rictu modico. Maxillæ debiles; superior margine ex ossibus intermaxillaribus omnino formato, maxillaribus retroductis et a labio partim celatis. Dentes minuti, acuti, in maxillâ utraq̃ue uniseriati; in linguâ et vomere biseriati; in ossibus palatinis et pharyngalibus nulli. Apertura branchialis amplissima, membranâ sex-radiatâ, subter gulam profundè emarginatâ, haud isthmo annexâ. Pinnae dorsalis et analis valde retropositæ, oppositæ. Pinnae pectorales et ventrales parvæ. Pinna caudalis leviter emarginata.*

There can be no doubt, I imagine, as to this being an entirely new form, and a very interesting one, from the circumstance of its being at the extreme end of the family to which it belongs, and its very much departing from the usual characters of that family. I have referred it to the *Cyprinidæ*, taking that group in the enlarged view in which Cuvier accepts it; though by those who divide it into subfamilies it would probably be associated with the *Cobitidæ*, or made to constitute a distinct one by itself. It agrees with the *Cyprinidæ* in general in the form of its mouth, in the upper jaw having its margin entirely formed by the intermaxillary, the maxillary being present, but placed behind and partly concealed in the thickness of the lip, and in the want of an adipose; but it altogether departs from that family in the entire want of scales, of which there is not even a vestige in the dried skin, and in which respect it would seem to shew an affinity to the *Siluridæ*. Yet it has none of the other characters of the family just mentioned. On the other hand, in the backward position of the dorsal and anal fins, which are opposite to each other, it agrees with the *Esocidæ*. The pharyngeal bones are unarmed, but this deficiency is made up for by the strong curved teeth on the tongue, independently of the minuter ones in the jaws.

The intestine is extremely short and quite straight, measuring only fourteen lines in length from the pylorus to the anus, in a specimen two inches and a half long. The stomach is of an oval form, of considerable capacity, very membranaceous, with the cardiac and pyloric openings near together at the upper extremity, from the latter of which the intestine is immediately reflexed to pass off to the anus. In the specimen dissected, the stomach was much distended by a nearly perfect individual of the genus *Colymbetes*, which appeared to have been recently swallowed, and was scarcely at all altered. There are no cæcal appendages. The air-bladder is of an elongated oval form, and of considerable development.

Mr. Darwin's collection contains no less than three species of this new genus, differing but slightly from each other. Two are from the most southern parts of South America, the third from New Zealand.

1. MESITES MACULATUS. *Jen.*

PLATE XXII. Fig. 4.

*M. viridescens-fuscus; dorso et lateribus maculis crebris, hic et illic confluentibus, nigris; ventre niveo; pinnarum radiis nigro-punctatis.*

B. 6; D. 10; A. 16; C. 16, &c.; P. 12; V. 7.

LONG. unc. 2. lin. 8.

FORM.—Slender and very much elongated. Body anteriorly subcylindrical, compressed behind. Greatest depth not more than one-eighth of the entire length: thickness about three-fourths of the depth. Head rather depressed, about one-sixth of the entire length. Snout short and rounded; mouth at the extremity; the gape moderate, not quite reaching to beneath the anterior angle of the eye. Lower jaw ascending a little to meet the upper, and, when the mouth is open, appearing rather the longest. Intermaxillary fixed, forming the entire margin of the upper jaw, the maxillary being behind it, and, though of nearly equal development, not very distinct: both bones slender. Teeth small, but sharp-pointed, rather widely apart, arranged in a single row along the edge of the intermaxillary, and in the lower jaw; the series above consists of about eighteen, that below of about twenty-one: also a double longitudinal row on the tongue, each row containing five or six teeth, the anterior ones curved, and larger than any of those in the jaws: a similar double row, but of minuter ones, down the middle of the vomer; none, however, on the palatines or pharyngeans. Eyes rather large, their diameter contained about three and a half times in the length of the head, distant scarcely one diameter from the end of the snout. The nostrils appear to consist of only a single aperture in front of the eye, in the neighbourhood of which, and also above the eye, are several large pores. The opercle and subopercle taken together approach to an oblong form, the posterior margin being straight and nearly vertical: the subopercle is not much developed, nor very distinct. Gill-opening very large, the membrane thick, with six rays, deeply notched beneath, and not fastened down. The whole skin is perfectly smooth and naked, invested with mucosity. No appearance of any lateral line, unless a fine dark streak be so called, passing along the middle of the sides, and dividing them into two equal parts.

The dorsal and anal are opposite to each other, and both placed very far back, almost at the extremity of the body. They commence in nearly the same vertical line, a very little anterior to the commencement of the last third of the entire length; but the anal being longer than the dorsal, it extends nearer the caudal. The form of these fins is much as in the genus *Cobitis*. The dorsal has the first three rays simple, the rest branched: the anal also has the first three simple, the first very short. Caudal about one-eighth of the entire length, with a shallow notch, the principal rays branched. The vent is just before the anal. The ventrals arise from about the middle of the entire length, the distance from their insertion to the commencement of the anal being twice their own length. The pectorals are small, and rather narrow, equalling about two-thirds the length of the head or hardly so much: they are attached low down, but not quite so low as in the genus *Cobitis*.



COLOUR.—(*In spirits*.) Greenish-brown, with numerous conspicuous spots and small irregular transverse bars of black. Under a lens the spots appear to be made up of thickly crowded black specks upon a dark brown ground: the bars result from some of the spots being confluent. The belly appears to have been white. The rays of all the fins are dotted with dusky, but the membranes transparent and colourless.

The individual described above was taken by Mr. Darwin in a fresh-water brook, in Hardy Peninsula, Tierra del Fuego. His collection, however, contains four other specimens found in streamlets and creeks high up the river of Santa Cruz in Patagonia, where they are said to have been numerous. Though these last are slightly different, they are evidently referable to the same species: they also vary a little from each other. Their peculiarities are as under:

The largest measures 2 inches 8 lines in length, and has the following fin-ray formula:

D. 12; A. 16; C. 16, &c.; P. 14; V. 7.

The next in size is 2 inches 6 lines, with the fin-ray formula thus:

D. 11; A. 16; C. 16, &c.; P. 13; V. 7.

These specimens agree in being both slenderer than the one from Tierra del Fuego. The depth is eight and a half, if not nine times in the entire length: the head rather more than one-sixth of the same. The colours are similar, except that the spots are not quite so numerous, and of a more regular form, seldom running together to form bars.

It is to these specimens that Mr. Darwin's notes refer, respecting the colours of this species in the recent state. As follows: "Pale greenish brown, with small irregular transverse bars of black; belly snow white."—D.

The third of the Patagonian specimens is 2 in. 2 lin. long. Fin-ray formula—

D. 10; A. 15; C. 16, &c.; P. 14; V. 7.

The fourth is of the same length.

D. 11; A. 15; C. 16, &c.; P. 13; V. 7.

These last two specimens are exactly similar to each other in colours, but differ from the former two in being almost immaculate, having only a few spots on the upper part of the back. This brings them very close to the following species, from which they are scarcely to be distinguished, except by their smaller eyes. It should be observed further, that the fleshy part of the tail in these specimens has the upper and under edges fringed with the short accessory rays of the caudal, a character which is not so obvious in any of the others.

## 2. MESITES ALPINUS. *Jen.*

*M. viridescens-fuscus, dorso saturatiore; hoc, et lateribus, et pinnis, nigro levissimè irroratis, immaculatis; ventre niveo; oculis majusculis.*

D. 10; A. 16; C. 16, &c.; P. 13; V. 7.

LONG. unc. 2. lin. 5.

FORM.—Very little difference in form between this and the last species. The eyes, however, are decidedly larger, measuring in diameter one-third the length of the head. The head itself also appears somewhat longer, being nearly one-fifth of the entire length. The anterior teeth on the tongue do not seem much larger than the others. Fins similar.

COLOUR.—(*In spirits*.) Greenish brown, deepening in tint at the top of the back. Back, sides, and fins, immaculate, but thickly powdered with minute dark specks, scarcely visible except under a lens. These specks give the fins a more dusky appearance than they possess in the last species. The belly appears to have been white.

A second specimen does not differ from the above in any respect, except in being rather smaller, and scarcely more than two inches in length.

Habitat, Tierra del Fuego.

This species was taken by Mr. Darwin in alpine fresh-water lakes in Hardy Peninsula, Tierra del Fuego. I have no hesitation in considering it distinct from the last, as there are two specimens exactly similar, both shewing a larger eye, and an entire absence of all approach to spots; while the whole surface of the back and sides is thickly irrorated with dark specks, a character which does not appear in the plain varieties of the *M. maculatus*.

## 3. MESITES ATTENUATUS. *Jen.*

PLATE XXII. fig. 5.

*M. viridescens-fuscus, ventre vix pallidiore; dorso, et lateribus, pinnarumque radiis, sparsim nigro levissimè irroratis, immaculatis: corpore prægracili, anticè attenuato; capite et oculis minoribus.*

D. 11; A. 17; C. 16, &c.; P. 12; V. 7.

LONG. unc. 2. lin. 6.

FORM.—Rather more slender than either of the last two species, the body more attenuated anteriorly; the head also smaller, though scarcely shorter. Mouth and eyes both smaller; the diameter of the latter not more than one-fourth of the length of the head. Teeth also rather more minute as well as more numerous. The fins are similar, except that the ventrals appear to stand rather more forward, being attached exactly in the middle of the entire length, excluding caudal: the distance from their insertion to the commencement of the anal is more than twice their own length. The outer rays of the caudal are worn, but there was probably a shallow notch when entire: the short accessory rays are very numerous, and form a very distinct fringe along the upper and lower edges of the fleshy part of the tail.

R



COLOUR.—(*In spirits.*) Greenish-brown, much more uniform than in either of the last two species, not deepening on the back, and scarcely becoming paler underneath. The back, sides, and rays of the fins, are finely irrorated with dusky specks, as in the *M. alpinus*, but not to the same extent, the specks being more thinly scattered, and here and there scarcely visible. From the same cause the fins appear paler.

Habitat, Bay of Islands, New Zealand.

This, which is a very distinct species of this new genus, was taken by Mr. Darwin in fresh-water in the Bay of Islands, New Zealand. It is well characterized by its more attenuated head and smaller eye, than those of either of the two others.

#### FAMILY.—ESOCIDÆ.

##### EXOCÆTUS EXSILIENS. *Bl.*?

*Exocætus exsiliens*, *Bl.* Ichth. pl. 397.

FORM.—Head about one-sixth of the entire length, and approaching to the form of a parallelopiped; very much flattened on the crown and between the eyes quite to the end of the snout, broader above than beneath, so that the cheeks are beyond the vertical inclining inwards at bottom. Snout short: mouth not much cleft; when shut, the jaws are equal, and the commissure of the lips appears to extend to beneath the anterior margin of the eye, but the maxillary, which retires completely beneath the suborbital, does not reach so far: when the mouth is open, the maxillary becomes vertical, and the intermaxillary being scarcely at all protractile, the lower jaw is a little the longest. Teeth very minute: a row, scarcely visible, along the forepart of the intermaxillary, but not extending to the sides of the jaw: none that can even be felt in the lower jaw, or in any other part of the mouth. Tongue rounded, and free at the tip. A loose veil of skin hangs down in front of the palate, from immediately behind the teeth in the upper jaw. Eyes round, and very large; the upper part of the orbit reaching to the line of the profile, and forming a slightly salient ridge: their diameter very nearly one-third the length of the head; between them and the end of the snout is two-thirds of a diameter; the distance from one to the other across the crown is one diameter and a quarter. The nostrils consist of one large round orifice a little in advance of the eyes. The membrane of the opercle forms a slightly salient angle backwards, near the upper part of the gill-opening. Scales large, of a somewhat irregular form, approaching to oblong, nearly twice as broad as long, the posterior margin with three or four incisions near the middle, and a few rather indistinct nearly parallel striæ on the surface of the basal portion; in others these striæ converge to form a small but very regular fan; and the scales appear to vary a good deal on different parts of the body.

The pectorals reach exactly to the base of the lateral caudal rays; the first two rays are simple, and all the others branched; first ray of all not half the length of the fin. Dorsal so situate as to leave a space between it and the end of the fleshy part of the tail about equal to its own length; the first ray simple, the others branched; the last prolonged beyond those which immediately precede it so as to form rather a point backwards. Anal similar to the

dorsal, and answering to it exactly. The ventrals are attached at a point, in this specimen, about half an inch posterior to the middle of the entire length, reckoning this to the end of the fleshy part of the tail; but are not much out of the middle, if the length be reckoned to the end of the upper lobe of the caudal: their length is contained not quite three and a half times in the entire length, excluding caudal; and they reach exactly to the end of the dorsal and anal: first ray very much branched, and only one-third the length of the fin; second ray appearing like two or even three rays at its upper extremity, from the circumstance of the several branches of it being of unequal length; all the other rays branched likewise. Vent a very little in advance of the anal. Upper lobe of the caudal one-third shorter than the lower; this last being exactly the same length as the ventrals.

D. 11; A. 12; C. 16, &c.; P. 18; V. 6.

Length 12 inches 8 lines.

COLOUR.—The colours were not noticed in the recent state; and the specimen is in such bad condition, and so much altered by the spirit, that they are now no longer distinguishable.

The flying-fish above described was taken by Mr. Darwin in the Pacific Ocean, off the coast of Peru, in Lat. 18° S. It appears to be the *E. exsiliens* of Bloch, but as I am not aware that the species of *Exocætus* have been ever rigorously worked out, and closely compared from different parts of the globe, I have thought it expedient to annex a description, by which it may be identified, if it prove hereafter distinct.\*

#### FAMILY.—SALMONIDÆ.

##### 1. TETRAGONOPTERUS ABRAMIS. *Jen.*

PLATE XXIII. fig. 1.

*T. corpore subrhomboido, compressissimo, altitudine fere dimidium longitudinis, pinna caudali exclusâ, æquante: osse maxillari angusto, retrorsum arcuato: pinna dorsali triangulari, suprâ ventrales accuratè exorienti; anali lævi, longâ, altitudine retrò cito decrescente; utraq; plicis membranaceis, radiis longitudinaliter adhærentibus, instructâ: squamis in lineâ laterali 46, in lineâ inter pinnas ventrales et dorsalem transversâ 17.*

B. 4; D. 1/10; A. 2/30; C. 19, &c.; P. 13; V. 8.

LONG. unc. 4. lin. 7.

FORM.—Of a subrhomboidal form, the nape and back being much elevated, whence the profile falls very obliquely and in nearly a straight line. Greatest depth nearly half the entire length, excluding caudal. Body very much compressed, the thickness being nearly three and a half times in the depth. Head approaching to a laterally flattened cone, with the length and height nearly equal. Snout very short; mouth but little cleft; when open, the lower jaw projecting

\* Swainson is of opinion that "more than double the number of species of *Exocætus* really exist above those that have been described."—*Nat. Hist. of Fishes*, vol. i. p. 299.



considerably. Maxillary narrow, and of nearly equal breadth throughout, curving backwards. Teeth with their cutting edges dentated, the middle point much the most developed, with one or two smaller ones on each side: two rows of such teeth on the intermaxillary, and one in the lower jaw, this last row with scarcely more than eight or ten teeth in it. No teeth on the maxillary, vomer, palatines, or tongue. Eyes round, rather large, their diameter three and a half times in the length of the head, distant not so much as one diameter from the end of the snout. Nostrils with two orifices, the posterior one a narrow curved slit, the anterior one a round hole. The suborbital forms a somewhat triangular naked disk beneath the eyes, with radiating veins. Posterior margin of the opercle very little curved: subopercle narrow, and small, forming but a small portion of the gill-flap.

About seventeen scales in the depth, and forty-six in the lateral line, which last bends downwards rather below the middle, and is continued quite to the caudal. A scale taken from the middle of the side below the lateral line is somewhat rounded anteriorly, the basal margin being straight; the surface marked with very fine numerous concentric striae, and with two coloured deeper striae on the free portion diverging from the centre in a V-like form: some scales have three or four of these coloured striae, drawn more or less regularly.

The dorsal commences in about the middle of the entire length, excluding the caudal and narrow part of the tail; of a triangular form, its greatest height equalling the depth to the lateral line. Pectorals narrow, shorter than the head, attached below the bottom of the gill-opening, and reaching rather beyond the insertion of the ventrals, which last are in a vertical line with the commencement of the dorsal and shorter than the pectorals. Anal long, commencing a very little beyond the tips of the reclined ventrals; the anterior portion rather more than half the height of the dorsal, but the posterior much lower, sloping rapidly off; two spines, the first very minute, the second about one-third the length of the first soft ray; the last soft ray double. The anal terminates nearly in a line with the adipose, which is small. Caudal forked for half its length: the lobes equal. Many of the rays in the vertical fins, more especially the dorsal and anal, are accompanied through nearly half their length from the bottom by membranous folds of skin. There are also some small scales along the base of the anal, but none apparent on the dorsal. In the axillae of the ventrals is an elongated scale, not half their length.

COLOUR.—“Back bluish silvery, with a silver band on the side: a bluish black spot behind the gills.

Fins pale orange; tail with a black central band.”—D.—There is now not much trace of the silver band, or the black band on the tail. The humeral spot is, however, still very distinct.

Habitat, the Rio Parana, South America.

This species was taken by Mr. Darwin in October in the Rio Parana, as high up as Rozario. I cannot ascertain that it is described, though there is much resemblance between it and the species figured in Seba.\* It differs from the *T. chalcus* of Spix, in its much smaller scales, not to mention other points of dissimilarity.

\* Thesaurus, vol. iii. pl. 34. f. 3.

## 2. TETRAGONOPTERUS RUTILUS. Jen.

PLATE XXIII. fig. 2.

*T. corpore ovali, compressissimo, altitudine tertiam partem longitudinis, hâc ad basin furcæ caudalis mensâ, æquante: osse maxillari angusto, retrorsum arcuato: pinnâ dorsali subtriangulari, paululum pone ventrales exorienti; anali lævi, longâ, altitudine retrò cito decrescente; utrâque plicis membranaceis, radiis longitudinaliter adhærentibus, instructâ: squamis in lineâ laterali 40, in lineâ inter pinna ventrales et dorsalem transversâ 14.*

D. 1/9; A. 2/27; C. 19, &c.; P. 14; V. 8.

LONG. unc. 4. lin. 3.

FORM.—More oval than rhomboidal: the back and nape not so much elevated as in the last species; the profile falling less obliquely. Depth one-third of the entire length, measured to the base of the caudal fork: head one-fifth of the same. Not above fourteen scales in the depth, and forty in the lateral line, which occupies the eighth row from the top. The scales on the whole similar, but with the basal margin not so straight and regular, and somewhat projecting in the middle in the form of a blunt salient angle. The dorsal commences a trifle nearer the caudal, and at the middle of the entire length, the caudal alone excluded. The pectorals reach just to the insertion of the ventrals, which last are a trifle in advance of the dorsal. The second anal spine is longer, and nearly half the length of the soft rays which follow.

COLOUR.—“Back iridescent greenish brown: a silver band on the side. Fins dirty orange: tail with a central black band; above and below the band bright red and orange.”—D.—The colours appear very similar to those of the last species. The humeral spot, however, is less obvious, while, on the other hand, the silver band on the side can still be distinguished.

Habitat, Rio Parana, South America.

Taken with the last species, to which it is very closely allied. Mr. Darwin observes in his notes, that both are among the commonest of the river fry in the Rio Parana.

Both this and the *T. Abramis* are distinguished by having narrow longitudinal folds of skin attached to the basal half of the rays of the dorsal and anal fins, a character which does not shew itself in any of the three species next to be described.

## 3. TETRAGONOPTERUS SCABRIPINNIS. Jen.

PLATE XXIII. fig. 3.

*T. corpore ovali, subelongato, valde compresso; altitudine tertiam partem longitudinis, caudali exclusâ, æquante: osse maxillari paulo dilatato, recto: pinnâ dorsali suboblongâ, altâ, pone ventrales exorienti; anali scabrâ, altitudine retrò gradatim decrescente; radiis plicis membranaceis nullis: squamis in lineâ laterali circiter 38, in lineâ inter pinna ventrales et dorsalem transversâ 12.*

D. 1/9; A. 3/22; C. 19, &c.; P. 13; V. 8.

LONG. unc. 3. lin. 7.



FORM.—Still more oval and elongated than the last species, the profile falling in a gentle curve from the dorsal to the end of the snout. Depth exactly one-third of the length, excluding caudal: head one-fifth of the entire length, caudal included. Maxillary rather dilated towards the bottom, and quite straight, not curving backwards as in both the last species. Teeth rather larger, and more conspicuous. Nostrils larger. Only twelve scales in the depth, the lateral line occupying the seventh row from the top: thirty-seven or thirty-eight in the lateral line. Scales of a rather different form; the basal margin more sinuous, the free margin not so regularly curved, the coloured striæ hardly obvious. Dorsal more oblong than triangular, higher in relation to the depth, of which it equals two-thirds, commencing at a point anterior to the middle of the length, excluding caudal. The pectorals reach a little beyond the ventrals, which are attached a little in advance of the dorsal. The anal has all the rays longer, and more nearly equal, the posterior part of the fin not being so much sloped off: there are three spines at the commencement, the first two minute, the third not quite half the length of the soft rays: this fin is furthermore distinguished from that of the two former species by the rays being set with asperities, which communicate a scabrous harsh feel to the touch, when the finger is passed along them from the base upwards.

COLOUR.—Not noticed in the recent state. In spirits it appears more silvery than either of the two last species: the back and upper part of the sides being brownish. A humeral dusky spot, and the remains of what was probably a bright silver band along the middle of the side from the gill to the caudal. At the base of the caudal is a dusky spot, which is prolonged in a line along the central rays to the commencement of the fork. The other fins faintly edged with dusky, but otherwise pale.

Habitat, Rio de Janeiro.

The more oval and elongated form, straight maxillary, and scabrous anal fin, at once distinguish this species from either of the two last. It was taken by Mr. Darwin in fresh water, at Rio de Janeiro, in June.

#### 4. TETRAGONOPTERUS TENIATUS. Jen.

*T. corpore ovali, valde compresso, altitudine tertiam partem longitudinis, hâc ad basin furcæ caudalis mensâ, æquante: osse maxillari margine posteriore recto: pinnâ dorsali suprâ ventrales accuratè exorienti; anali lævi, altitudine retrò cito decrescente; radiis plicis membranaceis nullis: squamis in lineâ laterali 40, in lineâ inter pinna ventrales et dorsalem transversâ 14.*

D. 1/10; A. 3/22, &c.

LONG. UNC. 2. LIN. 2.

FORM.—Depth and general form similar to those of the *T. rutilus*; also the same number of rows of scales, the lateral line occupying the eighth from the top. Anal smooth, and similar to that of the *T. rutilus* in form, but in the number of the spines and soft rays agreeing with the *T. scabripinnis*. The maxillary straight, but hardly so much dilated as in the last-named species, being of nearly equal breadth throughout. The teeth are more numerous than in either, amounting in the lower jaw to fourteen or more. The ventrals are in an exact line with the commencement of the dorsal.

COLOUR.—Much as in the *T. scabripinnis*. The same silver band, only more brilliant; also the same humeral spot, and the spot at the base of the caudal extending along the middle rays.

Habitat, Rio de Janeiro.

The above description is that of two small specimens, similar to each other, obtained by Mr. Darwin in a running brook at Socego, in the province of Rio de Janeiro. They are probably not full grown; but so evidently distinct from either of the last two species, the characters of which are in some measure combined in them, that I have not hesitated to give them a separate place. The silver band is more or less obvious in all the species of this genus brought home by Mr. Darwin, but it is much brighter in this than in any of the others.

#### 5. TETRAGONOPTERUS INTERRUPTUS. Jen.

PLATE XXIII. fig. 4.

*T. corpore ovali, valde compresso: altitudine tertiam partem longitudinis totius æquante: ore parvo; osse maxillari brevissimo, dilatato, margine posteriore recto: dentibus minutis, multicuspidatis: dorsali subtriangulâ, pone ventrales exorienti; anali (in uno sexu?) scabrâ, altitudine retrò subito decrescente; his pinnis plicis membranaceis nullis: squamis in lineâ longitudinali 35, in lineâ inter pinna ventrales et dorsalem transversâ 10: lineâ laterali interruptâ, hâud finem pinnae pectoralis attingente.*

D. 1/10; A. 2/18; C. 18, &c; P. 11; V. 7

LONG. UNC. 2. LIN. 8.

FORM.—Oval, and not very dissimilar in general form to the *T. rutilus*, but rather more elevated above the shoulder. Depth exactly one-third of the entire length: head one-fourth of the same, caudal excluded. Profile not exactly straight, but very slightly hollowed out at the crown, then as slightly protuberant above the eyes, whence it falls more rapidly in front, giving the snout a short and blunt appearance. Mouth much smaller than in any of the preceding species, owing to the extreme shortness of the maxillary, which is broad, with the anterior margin curving outwards, but the posterior one straight. Teeth very small; the points on the cutting edges numerous (five or six on each tooth) and nearly equal; apparently only one row on the intermaxillary, and the same in the lower jaw; none on the maxillary. Eyes and nostrils as in the other species, but the anterior orifice of the latter larger. Subopercle much larger, forming a greater portion of the gill-flap. Scales relatively larger; only ten in the depth, and thirty-five in the length. They have no deep striæ on the basal portion, and consequently no fan; but they are very regularly marked with the usual finer striæ concentrically arranged, except on the free portion where they become indistinct.

The lateral line occupies the sixth row of scales from the top, but is very soon interrupted, coming to an end before it has reached the length of the pectoral, and not carried over more than eight or nine scales in the length. Dorsal subtriangular, commencing exactly at the middle of the length, caudal excluded. Anal shorter than in the other species, and not reaching so near the caudal; two spines, but the first extremely minute. Caudal forked for half its



length, the lobes equal. Ventrals more forward than in the other species, decidedly in advance of the dorsal, and attached at one-third of the entire length; their axillary scale very small. Pectorals narrow, reaching beyond them. No long folds of skin accompanying the rays of the vertical fins.

COLOUR.—Not noticed in the recent state, in which, judging from its appearance in spirit, it was probably silvery, or perhaps golden, with somewhat of an olivaceous hue becoming deeper on the back. There are evident remains of a bright longitudinal lateral band: also of a black spot at the base of the caudal. The dorsal and the anterior portion of the anal incline to dusky: the pectorals and ventrals are slightly dusky at their extremities; there is also a large irregular dusky stain on the back and shoulders anterior to the dorsal fin.

A *second specimen* differs from the above in being a trifle smaller, and not quite so deep in the body. The anal is also decidedly scabrous, as in the *T. scabripinnis*, and has one ray less in it. The colours are similar, excepting that the fins are rather less dusky, and the large dusky stain on the back and shoulders is wanting.

Habitat, Maldonado.

This species is one of several that were taken by Mr. Darwin at Maldonado, in the lake that had been suddenly drained, before alluded to. It is immediately distinguished from all the others in this genus above described, by its small mouth and abbreviated lateral line. The circumstance of the anal fin being scabrous in only one of the specimens leads to the suspicion that this may be a sexual character, perhaps common to this and several species; and, judging from its somewhat less depth, I conceive the specimen so distinguished in this instance to be a male.

#### HYDROCYON HEPSETUS. *Cuv.*

Hydrocyon hepsetus, *Cuv.* Reg. An. (ed. 2) tom. ii. p. 312.

——— *falcatus*, *Freycinet*, (Voyage) Zoologie, p. 221, pl. 48. fig. 2.

FORM.—Back rising slightly from the nape, whence the profile in front falls obliquely in nearly a straight line to the mouth. Depth contained about three and a half times in the length, caudal excluded. Both head and body much compressed, the greatest thickness being only two-fifths of the depth. The length of the head equals the depth of the body. Snout appears rather pointed when the jaws are shut; when open, the lower jaw is a little the longest. Gape considerable. Maxillary long, commencing before the eyes, and reaching to a vertical from the posterior part of the orbit; inclining downwards, lapping obliquely in part over the lower jaw, gradually widening towards the posterior extremity, which is rather obliquely rounded. Inter-maxillary with two sharp canines in front, then on each side four or five very small hooked teeth, then another large canine, though not so large as those in front; behind this commences the maxillary, which is armed all along its margin with a regular row of small equal hooked teeth, resembling sharp serratures; a similar row on each palatine, but none on the vomer or tongue; this last pointed, and free at the tip. Lower jaw with two strong canines in front, larger than those in the upper, and fitting into two holes above, when the mouth is shut; on each side of these are three only half their size, but increasing backwards, placed at rather wide

intervals; then follow a row of close, minute, sharp teeth, similar to those on the edge of the maxillary. Eyes rather large, their diameter not quite one-fourth the length of the head, distant one diameter and a quarter from the end of the snout. Suborbital large, consisting of three pieces. Preopercle rectangular. A row of pores, not very distinct, along the under part of the lower jaw, thence continued along the limb of the preopercle. Opercle and subopercle taken together with the posterior margin forming a slight but regular curve, with scarcely any salient angle.

Head naked; scales on the body of moderate size, arranged in somewhat oblique rows, especially below the lateral line; one from the middle of the side below the lateral line of an irregularly rounded form, the posterior margin rather sinuous, the disk with numerous fine concentric striæ, but no deeper-cut striæ on the basal portion. About sixteen scales in a vertical row, and fifty-seven or fifty-eight in the lateral line: this last bending downwards in a curve which falls below the middle of the depth. Scales on the lateral line not larger than the others.

The dorsal answers to the space between the ventrals and anal; its height equals the depth to the lateral line. Anal long, commencing exactly under the last ray of the dorsal; the first part of this fin as high as the dorsal, but the rays, beyond the fifth, gradually decreasing; three spines, the first two very minute; the last soft ray double. Caudal in this specimen injured. Adipose and last ray of the anal in the same vertical line. Pectorals two-thirds the length of the head, attached very low down beneath the terminating portion of the gill-flap, narrow and slightly falcate, reaching to the ventrals, which last are one-fourth shorter. A long narrow scale in the axilla of each ventral one-third the length of the fin itself.

B. 4; D. 11; A.  $3/26$ ; C. 22, &c.; P. 12; V. 8.

Length 4 inches 3 lines.

COLOUR.—“Bluish silvery.”—D.—Some appearance of a dusky spot at the base of the caudal prolonged in a line along the middle rays, but scarcely any trace of a humeral one. The dorsal and anal incline a little to dusky.

Taken at Maldonado, in a fresh-water lake, in June. I have scarcely any doubt of its being the *H. falcatus* of the Zoology of Freycinet's voyage, the figure of which it exactly resembles, excepting that the humeral dark spot, if it ever existed, and which is not mentioned in Mr. Darwin's notes, is now almost entirely effaced. It is probable, however, that there are two or three species nearly allied, for which reason I have been the more particular in my description. The *H. Hepsetus* of D'Orbigny\* appears to differ from the *H. falcatus* of Freycinet (with which last Cuvier associates his name of *Hepsetus*), in having the lateral line curving upwards rather than downwards, and the caudal fascia as well as the humeral spot more marked. The *Salmo falcatus* of Bloch is probably distinct from both.

\* *Voy. dans L'Amer. Mérid.* Atl. Ichth. pl. 9. fig. 2.



GENUS.—APLOCHITON. *Jen.*

*Corpus elongatum, compressum, subfusiforme, undique nudum alepidotum. Caput parvum. Rostrum breviusculum, subacutum. Os terminale, rictu modico. Maxilla superior margine ex ossibus intermaxillaribus omnino formato, maxillaribus, hæc subæquantibus, retroductis. Dentes minuti, acuti, in maxillâ utraq̃ue uniseriati, in linguâ et vomere longitudinaliter biseriati, in ossibus palatinis nulli. Apertura branchialis amplissima, membranâ triradiatâ, subtus profundè emarginatâ. Pinne, dorsalis paululum pone ventrales, analis paululum pone dorsalem reclinatam, exorientes. Ventrals appendicibus axillaribus nullis. Pinna caudalis bifurca.*

I have already noticed a remarkable new form among the *Cyprinidæ* brought home by Mr. Darwin, and differing from all the known genera in that family by the entire absence of scales. The one now to be described is not less remarkable among the *Salmonidæ*, and, what is particularly interesting, would seem to occupy an exactly analogous place in this family, departing from it in the same important character of having the skin perfectly naked and free from scales. There are, however, many other points of similarity between *Mesites* and the genus which I have here termed *Aplochiton*.\* In both there is the same form of mouth, the margin of the upper jaw being entirely formed by the intermaxillary, behind which is the maxillary of nearly equal development. The teeth in the jaws are similar, both in regard to form and arrangement; there is also the same double longitudinal row on the tongue, and along the vomer. The pieces of the opercle are similar, and the gill opening equally large in both genera, though the branchial membrane has twice the number of rays in *Mesites* that it has in *Aplochiton*. Furthermore, the fins are on the whole very similar, with the exception of the dorsal not being so far back in *Aplochiton*, and there being also an adipose in this genus. It is also deserving of notice that both these new forms, so resembling each other in many of their characters, come from the same quarter of the globe, being found either in the most southern parts of S. America, or in the neighbouring islands.

From the circumstance of the naked skin, *Aplochiton* might by some be referred to the *Siluridæ*, but what was said of the genus *Mesites* may be repeated here, that it has none of the other external characters of that family. The maxillary, instead of being reduced to a mere vestige, or lengthened into a barbule, is as much developed as in any of the *Cyprinidæ*, and of the usual form; the subopercle also is very distinct;† while there is no strong spine at the commencement of either the dorsal or pectoral fins. At the same time it must be mentioned that *Aplochiton*

\* Ab απλος simplex, et χιτων tunica.

† Valenciennes says, in his preface to the fifteenth volume of the "Histoire des Poissons," that none of the *Siluridæ* have the subopercle; and that the absence of this bone serves to distinguish them from *Cobitis*.

agrees with the *Siluridæ* in having no cœcal appendages, though the air-bladder is similar to that of the ordinary *Salmonidæ*. There are some peculiarities connected with the anal and sexual orifices which I shall notice presently, along with other points in the internal structure, in the species to be described first.

Mr. Darwin has brought home two species of this new genus, agreeing precisely in form, but very distinct in respect to size and colouring.

1. APLOCHITON ZEBRA. *Jen.*

PLATE XXIV. FIG. 1.

*A. obscurè plumbeus; fasciis nigris transversis: maxillis æqualibus.*

B. 3; D. 11; A. 2/14; C. 16, &c.; P. 18; V. 7.

LONG. unc. 9. lin. 6.

FORM.—General form somewhat resembling that of the *Macharel*, elongated, and approaching to fusiform. Greatest depth about the middle, equalling one-sixth of the entire length. Line of the back and profile nearly straight, the latter falling very little. Greatest thickness rather more than half the depth. Head small, contained about five and a half times in the entire length. Snout short, but rather acute. Mouth with a moderate gape reaching to beneath the anterior angle of the eye: when shut, both jaws equal, the lower one ascending at an angle of 45° to meet the upper; when open, the lower one a little the longest. Margin of the upper jaw formed by the intermaxillary, the maxillary appearing behind it. A single row of small but sharp teeth extending along the entire margins of both jaws: a double row of similar teeth, but stronger and more curved, down the middle of the tongue; also a double row along the middle of the vomer. Eyes moderate; their diameter four and a half times in the length of the head; distant about one diameter and a quarter from the end of the snout, and with an interval between them of about one and a half. Nostrils with two orifices, both roundish, one before the other, with a little interval between, the posterior one rather the largest. Two distinct pores on each side of the crown, one behind the other with an interval between, above and rather behind the eyes. Gill-opening very large, the membrane with only three flattened rays, deeply notched beneath, the notch reaching to beneath the middle of the eyes. All the pieces of the opercle present, but the interopercle only just appearing behind the angle of the preopercle, and the subopercle forming but a narrow lanceolate lamina beneath the true opercle, which last constitutes the greater portion of the gill-flap, and is of an oblong form, the posterior margin being cut straight and vertical.

The whole skin perfectly naked everywhere, without the least vestige of scales. No lateral line, except a faint streak, passing along the middle of the sides, be so called. Dorsal commencing at the middle of the length, this last being measured to the base of the caudal fork; of the same form as in the ordinary species of the genus *Salmo*; its greatest height a little exceeding its length, which last is rather more than half the depth of the body; first ray simple, the rest branched. Adipose small, and just half way between the end of the dorsal and the base of the caudal. Anal of a somewhat triangular form, the margin sloping very much off backwards, commencing a little beyond the tip of the reclined dorsal, and terminating opposite



the adipose, or perhaps a trifle beyond it; two small spines at its commencement; the first two soft rays simple, the others branched. Caudal forked for half its length, the lobes equal; the whole fin contained about six and a half times in the entire length; the accessory rays very numerous, and partially fringing the upper and lower edges of the tail. Pectorals attached behind the gill-opening, rather below the middle, about two-thirds the length of the head, of a somewhat triangular form, the rays gradually shortening from the first, which is the only one unbranched. Ventrals attached a very little in advance of the dorsal, rounded, or almost cut square at the ends, the rays being all nearly equal. They are scarcely shorter than the pectorals: the space between their insertion and the commencement of the anal is nearly double their own length. There is no long scale or appendage of any kind in their axillæ.

COLOUR.—“Dull leaden colour.”—D.—In spirits it appears brown. The sides are banded with some irregular transverse zebra-like marks, not noticed by Mr. Darwin, reaching from the back down two-thirds or three-fourths of the depth, some terminating sooner than others. All the fins brownish.

Habitat, Falkland Islands.

Mr. Darwin obtained three specimens of this remarkable fish all precisely similar, from a fresh-water lake in the Falkland Islands, in March. The lake was not far from the sea, and connected with it by a brook. He adds in his notes that the species is common there; that it is good eating, and grows to be about half as large again as the individuals procured.

One of these specimens was dissected by Mr. Yarrell and myself, and presented the following internal characters, which are of importance to be noted. The coats of the stomach were thick and muscular; the œsophageal portion with prominent longitudinal plicæ. Its contents, so far as they could be ascertained, consisted of the remains of caddis-worms. The intestine was large, without any cœcal appendages, but with one spiral convolution at the end of the first third of its length from the pyloric orifice: the entire length of the canal was four inches. The air-bladder was large, undivided, and of the same general form as in many of the *Salmonidæ*. There were two elongated flattened lobes of roe nearly ready for exclusion. The anal and sexual orifices were separated, but enclosed in a tubular sheath, common to both, directed backwards; the sheath itself lying in a groove in the abdomen, and five-eighths of an inch in length: the opening to the cavity of the abdomen and sexual organs was at the extreme end of this sheath, and partly closed by two lateral valves; the opening to the intestine, three-eighths of an inch short of the extremity.

## 2. APLOCHITON TENIATUS. Jen.

PLATE XXIV. FIG. 2.

*A. olivaceus, punctis fuscis minutissimis irroratus; lateribus vittâ longitudinali argenteâ: maxillâ inferiore longiore.*

LONG. unc. 3. lin. 10.

FORM.—A much smaller species than the last, but the general form similar. Rather more elongated, the depth being contained seven and a half times in the length. Head one-fifth of the length measured to the base of the caudal fork. Snout a little longer, and more pointed. Lower jaw at all times a little the longest. Teeth similar, and similarly disposed. Nostrils similar; but no pores on the crown, or only one on each side, and that not very distinct. All the fins similar.

COLOUR.—Not noticed in the recent state. In spirits it appears of a uniform greenish or olivaceous brown, the back and sides very minutely dotted with darker brown. There is a pale silver band along the middle of the side, not bounded, however, by any definable line, but shading off insensibly into the brown above and below. The irides are still bright, and appear to have been golden.

Habitat, Goree Sound, Tierra del Fuego.

There are three specimens of this second species in the collection, all of the same size, and not differing in any respect from each other, except that one of them has thirteen rays in the dorsal fin, and fourteen soft rays in the anal. Mr. Darwin's notes state that they were taken at Goree Sound, Tierra del Fuego, in the mouth of a fresh-water stream, where the water was quite fresh; and that when put into salt water they immediately died.

The silver band at once distinguishes this elegant species from the last, independently of its smaller size. The specimens appear full grown.

There is the same peculiarity with respect to the anal and sexual orifices in this species, as in the one previously described.

## FAMILY.—CLUPEIDÆ.

### 1. CLUPEA FUEGENSIS. Jen.

Mr. Darwin's collection contains a single individual of a species of *Clupea* from Tierra del Fuego so extremely similar to the young of the common Herring, that it might almost be mistaken for it. As it is small, and in not very good preservation, I shall merely point out some of its leading characters.

Depth of the body the same as in a young *Herring* of the same size. Belly carinated, but with the serratures not more developed than in that species. Teeth the same, and very minute. The maxillary does not slope inwards quite so much at its upper extremity, before uniting with the intermaxillary; but the mouth and its several parts are in all other respects similar. The same may be said of the pieces of the opercle, excepting that there is a more sensible notch near the upper part of the posterior margin of the gill-flap, much as in the common *Sprat*. It



differs also from the Herring in having the ventrals exactly in a line with the commencement of the dorsal, this last being placed a little further back than in that species.

D. 18; A. 19; C. 19, &c.; P. 18; V. 8.

Length 3 inches.

“Caught at night, off Cape Ines, Tierra del Fuego, two miles from the shore, in thirteen fathoms.”—D.—The specimen is probably not full-sized,

### 2. *CLUPEA ARCUATA*. *Jen.*

The present species is from Bahia Blanca. The specimens, of which there are two, are also in bad condition like the last, and probably not full-sized.

FORM.—Body deep, with the ventral line swelling rather more outwards than the dorsal. Greatest depth a little exceeding one-fourth of the entire length. Very much compressed: abdomen carinated, and very sharply serrated, the serratures sharper than in the common sprat. A few minute teeth at the extremity of the lower jaw, and also on each side of the intermaxillary, near its junction with the maxillary; the lower half of this last finely serrated. Pieces of the gill-cover much as in the Sprat; the subopercle rounded at bottom, the opercle with a shallow notch near the upper angle.

The dorsal commences exactly in the middle of the entire length, excluding caudal. The ventrals are as nearly as possible directly beneath its first ray: these fins are very small, and shorter than in the sprat.

D. 18; A. 23; C. 19, &c.; P. 16; V. 7.

Length 4 inches 2 lines.

COLOURS.—“Back blue; belly silvery.”—D.

The second specimen is similar, only smaller. Both were taken in the month of September.

### 3. *CLUPEA SAGAX*. *Jen.*

A third species of *Clupea*, in Mr. Darwin's collection, likewise in bad condition, much resembles in general form the common Pilchard.

Depth the same as in the Pilchard, but the head larger and longer than in that species, being one-fourth\* of the entire length. Abdomen smoother; no appearance of any serratures in front of the ventrals. Lower jaw but little advanced beyond the upper. No perceptible teeth, more than a few very minute serratures near the lower extremity of the maxillary. Diameter of the eye about one-fifth the length of the head. The form and veinings of the pieces of the opercle very much as in the Pilchard, but the interopercle more developed. The posterior margin of the opercle and subopercle taken together is almost quite straight, without any emargination anywhere, and not far out of a vertical; the subopercle is cut nearly square at bottom. The preopercle is much veined: there are also some veins on the upper part of

\* In the pilchard it is one-fifth.

the opercle, and lower down on this last piece some very deep striæ, running parallel to its junction with the preopercle, as in the Pilchard, but still more strongly marked.

The commencement of the dorsal is very little anterior to a middle point between the end of the snout and the base of the middle caudal rays. The ventrals are beneath the posterior half of the dorsal as in the Pilchard. There are the same two elongated scales on each side of the caudal as in that species. The scales on the body, however, are much smaller than in the Pilchard, with their free portions striated, the basal portions marked with some irregular curved lines running in a transverse direction towards the median line of the scale.

D. 11; A. 18 or 19; C. 19, &c.; P. 18; V. 8.

Length 10 inches 6 lines,

Habitat, Lima, San Lorenzo Island.

### *ALOSA PECTINATA*. *Jen.*

PLATE. XXV.

*A. corpore ovali, altitudine prope tertiam partem longitudinis æquante: ventre carinato, serraturis, præsertim inter pinna ventrales et analem, acutis: maxillis subæqualibus, edentulis: preoperculo venoso; operculo striato: squamis pectinatis: pinnis ventralibus paulo ante dorsalem exorientibus.*

D. 16; A. 21; C. 19, &c.; P. 17; V. 7.

LONG. UNC. 12.

FORM.—Of an oval compressed form, the depth very considerable, equalling very nearly one-third of the entire length. Head contained about three times and three quarters in the same. Abdomen sharply carinated, with strong serratures, especially between the ventrals and anal. Jaws nearly equal, perhaps the lower one a little the longest; intermaxillary deeply notched; no apparent teeth anywhere. Eyes rather high, partly covered both anteriorly and posteriorly by a membranaceous veil; their diameter about one-fifth the length of the head; more than one diameter between them and the end of the snout. Subopercle obliquely rounded off at bottom, but the curvature of the posterior margin of the opercle and subopercle taken together not very considerable. Preopercle marked with vein-like ramifications; opercle similarly veined, and also striated below, as in the species last described, though more finely. Scarce any trace of a lateral line.

Scales moderately large, thin and membranaceous. One from the middle of the side of a sub-oblong form, the hinder angles rounded, its length only two-thirds of its breadth; the greater portion of the surface marked with exceedingly delicate striæ; scarcely visible without a strong lens, the anterior margin pectinated, and with a slightly projecting lobe in the middle. The scales as they approach the tail, become longer in proportion to their breadth, the basal margin more rounded, and sometimes with a strongly projecting lobe in the middle. The pectinations are longest on the scales covering the nape.

The dorsal commences a little behind the middle point of the oval of the body, and the ventrals are attached a little in advance of that fin. The anal commences a little behind the termination of the dorsal, and reaches to the commencement of the fleshy part of the tail: the last ray in both dorsal and anal is slightly lengthened beyond the preceding ones. The pec-



torals reach to the ventrals, and are contained about once and two-thirds in the length of the head. Caudal deeply forked; the lower lobe a little longer than the upper one: the base appears to have been covered with minute scales. Above the pectorals is a thin membranaceous lanceolate scale, more than half the length of the fin: a somewhat similar scale in the axillæ of the ventrals, but shorter in proportion; another below those fins.

COLOUR.—“Body silvery: dorsal scales iridescent with green and copper: head greenish: tail yellow.”—D.

A second specimen agrees with the above in form, but is smaller, measuring only  $7\frac{1}{2}$  inches. The colours, when recent, according to Mr. Darwin's notes, were as follows:—“Scales silvery iridescent; back especially greenish; caudal fin yellow: remarkable for a circular dark green patch behind the gill-cover.”—D.

Habitat, Bahia Blanca.

This species was caught by Mr. Darwin in the net, on a sandbank, at Bahia Blanca. It is well characterized by its strongly-pectinated scales, and does not appear to have been noticed by authors; though it would seem in that respect to have some affinity with the *Clupea fimbriata* of Bowdich.\*

#### ENGRAULIS RINGENS. Jen.

*E. capite compresso, grandiusculo, quartam partem longitudinis totius æquante: rostro acuto, ultra maxillam superiorem mediocriter prominulo; mandibulâ angustâ, dentibus lateralibus (ut etiam in maxillâ) minimis: corpore compresso: pinnis ventralibus infra, vix ante, initium pinne dorsalis exorientibus: squamâ longissimâ membranaceâ super pinnam pectoralem retrorsum productâ.*

D. 15; A. 19; C. 19, &c.; P. 16; V. 7.

LONG. unc. 5.

FORM.—Closely resembling the common Anchovy, but the head decidedly larger and longer, being one-fourth of the entire length.† Eye larger, but bearing an equal proportion to the size of the head; also rather nearer to the tip of the snout in consequence of this last not being so acute and much produced. Lower jaw rather narrower, from the greater compression of the head and body. Maxillary, and its fine serratures on the edges for teeth, similar.

The depth of the body is about one-sixth of the entire length. The dorsal commences at the middle point of the length, reckoning this last to the base of the caudal fork, and terminates a little before the commencement of the anal: the first ray is not half the length of the second and third, which equal three-fourths of the depth: the fifth and succeeding rays become gradually shorter than those which precede. The first ray in the anal is likewise very short, and scarcely one-third of the next following. The ventrals arise almost directly under the first ray of the dorsal, being scarcely at all in advance; when laid back, they do not reach half-way to the anal. Above the pectoral is a long membranaceous scale equalling, or very nearly, the fin itself.

\* *Excursions in Madeira*, p. 234, fig. 44.

† In the *E. enchrasicholus*, it is hardly one-fourth of the length, excluding caudal.

COLOUR.—Not noticed in the recent state. In spirits, it appears silvery, with the back and upper part of the sides deep dusky blue, the two colours separated by a well-defined line.

Habitat, Iquique, Peru.

This is probably an undescribed species of *Engraulis*; nor am I aware that authors have hitherto noticed any from the west coast of America. Mr. Darwin obtained two specimens which are precisely similar to each other. The species closely resembles the common European Anchovy,\* differing principally in its larger head, and more backward ventrals in respect to the dorsal.

#### FAMILY.—PLEURONECTIDÆ.

Mr. Darwin's collection contains individuals of five species belonging to this family, besides the drawing of a sixth; but the specimens brought home are dry, and badly preserved. Two appear to have been previously noticed; but it is difficult to pronounce upon the other three with certainty, neither do they admit of being very accurately described. These last, therefore, I shall not venture to name, but merely point out a few of their principal characters, adding the localities whence they were obtained.

The species, of which there is a drawing, I conceive to be certainly new; and as its characters are very distinguishable, I shall name it in honour of the gentleman, one of the officers of the Beagle, by whom the drawing was made.

#### 1. PLATESSA ORBIGNYANA. Val.?

*Platessa Orbignyana*, Val. in D'Orb. Voy. dans l'Amer. Mérid. Atl. Ichth. Pl. 16. fig. 1.

FORM.—Oval; greatest breadth two and a half times in the length. Eyes on the left side, near together, and equally in advance. Teeth in a single row, sharp-pointed, moderately strong, rather widely separate: posterior extremity of the maxillary cut nearly square. Dorsal commencing in a line with the eyes, and leaving a space between it and the caudal. The lateral line takes a sweep over the pectoral. Upper or eye side of the body slightly rough, with the scales finely ciliated; under side smooth, the scales on this side not ciliated.

COLOUR.—“Above dirty reddish brown; beneath faint blue: iris yellow.”—D.

Length 8 inches 9 lines.

Habitat, Bahia Blanca, where it is said to be plentiful.

This species agrees so well with the figure of the *P. Orbignyana* in D'Orbigny's Voyage, that I have little hesitation in considering it the same,—but as

\* I am indebted to Mr. Yarrell for the loan of a specimen of our common Anchovy for comparison.



no description of this last has been yet published, it is still possible I may be mistaken.

## 2. PLATESSA——?

FORM.—Very similar to the last species, from which it scarcely seems to differ, except in having the teeth smaller, and somewhat more numerous and closer together; also in the maxillary, which is more dilated at its posterior extremity, and more obliquely truncated. The scales are extremely similar.

Length 6 inches 6 lines.

COLOUR.—Not noticed.

Habitat, King George's Sound, New Holland.

## HIPPOGLOSSUS KINGII. Jen.

PLATE XXVI.

*H. fuscus: corpore ovato, lato: oculis sinistris, haud valde approximatis: dentibus acutis, fortioribus: lineâ laterali anticè arcuatâ: pinnâ dorsali supra oculos initium capienti, dimidio anteriore humillimo, posteriore modicè elevato: ventralibus distinctis, haud anali continuis: caudali subquadrata, radiis mediis cæteris paululum longioribus.*

D. 18 et 48; A. 51; C. 14; P. 11; V. 6.

FORM.—Breadth, not including the dorsal and anal fins, half the length of the oval of the body. Eyes on the left side, apparently distant from each other about two diameters; the upper one a little behind the lower. Teeth sharp and strong, forming a very regular series. The lateral line takes a sweep over the pectoral fin. The dorsal commences above the upper eye; the first half, or until it gets above the extremity of the reclined pectoral, is very little elevated, and much lower than the rest of the fin, with the membrane apparently notched between the rays; the remainder of the fin attains a moderate elevation, and there is an abrupt transition from the former to the latter portion. The anal answers to the elevated portion of the dorsal: both these fins fall short of the caudal by a small space. Pectorals short, and of a somewhat triangular form. Ventrals very distinct, free, placed right and left, with the rays a little projecting beyond the membrane; which last character appears also in the dorsal and anal. Tail somewhat square, but the middle rays slightly projecting beyond the lateral ones in the form of an obtuse lobe.

COLOUR.—Represented in the drawing of a uniform light brown.

Habitat, Valparaiso.

This is the species of which, as before stated, no specimen was brought home, but only a coloured drawing made by Mr. Phillip King, an officer of the Beagle, for Capt. FitzRoy. The drawing appears to have been done with accuracy, and from it the above description has been taken. The fin-ray formula, however, was computed from the recent fish, the above numbers being marked upon the drawing.

The teeth appear to indicate this species as belonging to *Hippoglossus* rather

than to *Rhombus*, though possibly it may be found hereafter to serve as the type of a distinct subgenus in this family. The form of the dorsal fin, if correctly delineated, is remarkable. The size of the fish is not stated.

## RHOMBUS——?

FORM.—Oval, approaching to rhomboidal. Breadth a little exceeding half the length. Eyes on the right side, near together, equally in advance, or the lower one perhaps rather more forward than the upper; between them a double osseous ridge. On the under side of the head, and nearly answering in position to the upper eye, is a deepish cavity, from whence proceeds a tentaculiform appendage four or five lines in length. Teeth very small, sharp, in scarcely more than two rows, and apparently confined to the under side. Lateral line sweeping over the pectoral. Dorsal commencing above the upper lip, and reaching nearly to the caudal, but leaving a minute space. Both sides of the body are smooth, but the upper one appears to have lost its scales. Pectoral on the eye side about three-fourths the length of the head.

Length 5 inches.

COLOUR.—“Above pale purplish brown, with rounded darker markings.”—D.

Habitat, Bahia Blanca, Coast of Patagonia.

## ACHIRUS LINEATUS. D'Orbig.

*Achirus lineatus*, D'Orb. Voy. dans L'Amer. Mérid. Atl. Ichth. Pl. 16. fig. 2.

FORM.—Body oval, but with the dorsal and anal fins included, approaching orbicular; the greatest breadth rather more than half the length. Eyes on the right side, moderately near together, the upper one a very little in advance. Lower jaw longest, projecting beyond the snout. Teeth forming a velutine band, very minute, and scarcely sensible except to the touch, confined to the side opposed to the eyes. Preopercle distinct from the opercle. A few short thread-like cirri on the under side of the head; two at the extremity of the snout being rather longer and more conspicuous than the others. Lateral line nearly straight throughout its course, somewhat higher at its commencement than afterwards, but taking no sweep. Both sides of the body rough, with ciliated scales, but the upper one most so. The dorsal commences above the upper lip, and reaches, as also the anal, almost quite to the caudal: this last rounded. Pectorals entirely wanting.

Length 9 inches.

COLOUR.—Not noticed.

Habitat, Rio Plata.

This species was obtained by Mr. Darwin in the market at Buenos Ayres, where it is said to be eaten. It so exactly accords in form with the figure of the *A. lineatus* in D'Orbigny's Voyage, that I have little hesitation in considering it the same, though, from the specimen being dried, there are no vestiges left of the transverse lines. Whether it be the *A. lineatus* of any other author I am uncer-



tain. It approaches, however, very closely the *Passer lineis transversis notatus* of Sloane.\*

PLAGUSIA——?

FORM.—Oval, but narrow, and much elongated for a *Sole*, the breadth in the middle being three and a half times in the length. Eyes on the left side, very small, and closely approximating, equally in advance, or if any difference, the lower one a little first. Mouth small, with velutine teeth on the supine side, but apparently none on the upper: snout a little produced in a point beyond it. The dorsal and anal unite with the caudal, which terminates in rather a fine point. No trace of any pectorals above or below. Scales strongly ciliated, especially above, and both sides of the body rough.

Length 7 inches.

COLOUR.—Not noticed.

Habitat, San Blas, Coast of Patagonia.

This species is very nearly allied to the *Plagusia Braziliensis* of Spix's work,† but it appears to differ in having the eyes one over the other, or the lower one perhaps a little in advance, instead of the upper one a little before the lower.

FAMILY.—CYCLOPTERIDÆ.

1. GOBIESOX MARMORATUS. Jen.

PLATE XXVII. Fig. 1.

*G. dorso et lateribus pallidè fuscis, nigro reticulatis et fasciatis: dentibus anterioribus majoribus, in maxillâ superiore subconicis, in inferiore incisivis: operculo posticè mucrone obtuso armato: membranâ branchiali spinâ gracili, subduplici, (præter radios solitos,) instructâ, magnâ ex parte celatâ, apice exserto: pinnâ dorsali tredecim-radiatâ.*

B. 6; D. 13; A. 11; C. 14 vel 15; P. 20 vel 21.

LONG. unc. 2. lin. 7.

FORM.—Head very large, broad and much depressed, with the snout rounded nearly in an exact semicircle. Body compressed behind, and suddenly tapering behind the pectorals. The length and breadth of the head are equal, each being one-third of the entire length, excluding caudal. Gape wide, reaching nearly to beneath the anterior angle of the eye. Teeth strong, and somewhat crowded in front; in the upper jaw bluntly conical, or slightly curved, but of irregular size, with minuter ones behind; very small at the sides of the jaw, and apparently here but in a single row: below, the six middle teeth are incisor-like, and project forwards; on each side of these are two or three similar to those in front above, then follow some minuter ones at the sides. Eyes rather more than a diameter apart. Gill-open-

\* *Nat. Hist. of Jamaica*, Pl. 246, fig. 2.

† *Pisces Brazil.* p. 89, tab. L.

ing wide, the membrane free all round, with six rays. Opercle terminating behind in a blunt point: there is also a kind of double spine concealed in the thickness of the branchial membrane, in front of the ordinary branchial rays, the extreme end of one portion of which projects a little beyond the margin.

The dorsal commences a little beyond the middle of the entire length, and leaves a space between it and the caudal; the rays nearly equal, except the first, which is short. The anal begins under the fourth or fifth dorsal ray, and extends a trifle further than that fin. Caudal slightly rounded.

COLOUR—(*In spirits.*) Back and sides light brown, reticulated with black: the reticulations have a tendency to form three or four broad fasciæ across the back. Under parts yellowish.

Habitat, Archipelago of Chiloe.

This and the following species appear to belong to the genus *Gobiesox* of Cuvier's "Regne Animal," and are probably new. Two specimens of the one above described were found by Mr. Darwin under stones off the island of Lemuy, in the Archipelago of Chiloe.

2. GOBIESOX PÆCILOPHTHALMOS. Jen.

PLATE XXVII. Fig. 2.

*G. fuscescenti-albidus, immaculatus: dentibus anterioribus majoribus, supra et subtus incisivis: operculo posticè spinâ acutâ armato; membranâ operculari margine, supra spinam, cirris paucis filamentosis fimbriato; membranâ branchiali spinâ nullâ: pinnis dorsali et anali septem-radiatis.*

B. 6; D. 7; A. 7; C. 12; P. 23;

LONG. unc. 1. lin. 10.

FORM.—General form the same as that of the last species, including the proportion of head to body. Snout equally rounded. Teeth on the whole similar, but the upper ones in front, as well as the lower, incisor-like. Eyes rather larger, closer together, less than a diameter apart. Differs essentially from the *G. marmoratus* in the form of the opercular spine, which is much sharper, as well as somewhat longer and slenderer; also in having no spine concealed in the branchial membrane: the lower part of the opercular membrane, just above the spine, is fringed with a few thread-like filaments. The number of branchial rays is the same.

The dorsal and anal are both shorter, and appear to have only seven rays each: the anal reaches a little nearer the caudal. The pectorals on the contrary have rather more rays.

COLOUR—(*In spirits.*) Every where of a uniform very pale brown, or brownish white, without any markings whatever. The eyes were probably very brilliant in the living fish, the irides still showing traces of what seems to have been blue and golden pink.

Habitat, Galapagos Archipelago.

A single individual of this species was obtained by Mr. Darwin in tidal pools at Chatham Island, in the Galapagos Archipelago.



## FAMILY.—ECHENEIDIDÆ.

## ECHENEIS REMORA. Linn.

Mr. Darwin took a small specimen of this fish from off a shark in the Atlantic Ocean, near St. Paul's Rocks. It is not four inches long. It has eighteen pairs of laminae on the head; and a rough disk on the middle of the tongue.\* caudal lunate.

## FAMILY.—ANGUILLIDÆ.

## ANGUILLA AUSTRALIS. Richards.

*Anguilla australis*, Richardson, Proceed. of Zool. Soc. 1841, p. 22.

FORM.—Very similar to the *A. latirostris*, Yarr., but the upper jaw rather shorter and broader, making the gape, which reaches to a vertical line from the posterior part of the orbit, wider. Teeth rather stronger. Dorsal commencing considerably beyond the first third, and not much in advance of the middle point, of the entire length; much less elevated than in the *A. latirostris*, its height scarcely exceeding one-fifth of the depth, which last is about one-seventeenth of the entire length. Vent a little posterior to the commencement of the dorsal.

The distance from the end of the snout to the insertion of the pectorals is rather less than one-eighth of the entire length: the form of the pectorals is lanceolate. The tail is rounded, much as in the *A. latirostris*.

	in.	lin.
Length (entire) . . . . .	17	3
From end of snout to commencement of dorsal . . . . .	7	6
From the same to insertion of pectoral . . . . .	2	2
From the same to vent . . . . .	7	9

COLOUR—(*In spirits*.) Appears similar to that of the common eel.

Habitat, New Zealand.

The above eel was procured by Mr. Darwin in fresh water in the month of December, in the Bay of Islands, New Zealand. It so nearly accords with the *A. australis* of Dr. Richardson from Van Dieman's Land, that I can hardly suppose it to be a distinct species. The vent, however, would seem to be a trifle backward, and the body deeper in proportion to its length. Without seeing more specimens, it is impossible to say what importance is to be attached to these points of discrepancy.

\* I notice this circumstance, because Mr. Lowe, in the "Proceedings of the Zoological Society," (1839, p. 89.) has briefly described two species of this fish, which he calls *E. Remora* and *E. pallida* respectively, the former having the tongue smooth, and the latter rough in the middle, besides other differences.

The above specimen obtained by Mr. Darwin, as well as two others in the Museum of the Cambridge Philosophical Society, have the tongue rough; though in their other characters, especially colour, they would seem to be Mr. Lowe's *Remora*. Cuvier, in his "Regne Animal," appears to consider the rough tongue as characteristic of the whole genus.

## CONGER PUNCTUS. Jen.

*C. lateribus fasciis transversis fuscescenti-rubris, interstitiis angustis griseis: rostro brevi, obtuso; maxillis subæqualibus: pinnâ dorsali initium supra pectoralem capienti: cute corporis puncturis parvis creberrimè aggregatis impressâ.*

FORM.—Body much compressed, except at the anterior extremity. Depth less than one-eleventh of the entire length. Head contained about seven and a half times in the same. Snout short and rounded. Jaws nearly equal, the upper scarcely longer than the lower. Gape scarcely reaching beyond a vertical from the anterior part of the eye. Teeth velutine. A row of very conspicuous pores round the edges of both jaws. The whole body, but not the head, thickly studded all over with small pores, much crowded, and appearing like pin-holes.

The pectorals are rather more than half the length of the head. The dorsal commences immediately above them, and has a moderate elevation of about one-third of the depth. The vent is a little posterior to the termination of the first third of the length, and the anal is immediately behind it. The dorsal and anal unite to form a moderately pointed caudal.

Length 3 inc. 3 lines.

COLOUR—(*In spirits*.) Sides very regularly banded with fourteen or fifteen transverse reddish brown fasciæ: the fasciæ extend on to the dorsal fin, and are much broader than the intervening spaces. All the under part of the head, belly as far as the vent, an irregular patch on the cheeks, and the spaces between the bands on the sides, yellowish.

Habitat, Tierra del Fuego.

This appears to be a new species. The individual described above is quite small, and stated in Mr. Darwin's notes to be the young of another and larger specimen which he also captured, but of which he does not mention the exact size, and which unfortunately does not appear in his collection. He has, however, mentioned the colours, which appear similar to those given above, and are as follows:—"Sides with transverse bars of chocolate and brownish-red, separated by narrow grey spaces." Whether the form and proportions of the adult agree exactly with those of the young as above detailed must be left for future observers to determine. The colours, however, appear well to characterize the species, aided by the minute punctures with which the whole body is covered.

This species was taken by Mr. Darwin at the roots of fucus, at the east entrance of Beagle Channel, Tierra del Fuego. The larger specimen is said to have been very active.

## 1. MURENA LENTIGINOSA. Jen.

*M. purpurascens-fusca; maculis circularibus, parvis, flavis: capite et rostro valde compressis; fronte declivi: maxillis subelongatis, angustis, æqualibus, acutis; dentibus acutis, in maxillâ superiore anticis uni-lateralibus bi-seriatis; in inferiore*



*anticis bi-lateralibus uni-seriatis; in vomere uni-seriatis; anticis supra subtusque, lateralibus secundariis supra, et vomerinis, fortibus: pinnâ dorsali anticè obsoletâ.*

LONG. unc. 20. lin. 6.

FORM.—Very much compressed about the head and jaws. Body tapering posteriorly; the depth in the middle equalling about one-thirteenth of the entire length. Head, measured to the branchial orifice, about one-seventh. Profile falling obliquely in a straight line from the nape to the extremity of the snout. Jaws very narrow, rather lengthened and sharp-pointed, equal. Gape deeply cleft, reaching as far back behind the eyes as it advances before them. Teeth compressed at the sides, very sharp, slightly hooked and pointing backwards; above, in a single row in front, in two rows at the sides; below, in two rows in front, and in a single row at the sides; in each case, however, the secondary row is very imperfect, some of them appearing to have been lost; also a row down the vomer, but interrupted in the middle of the series: the front teeth above and below, and the secondary ones at the sides of the upper jaw, are much stronger than the others; but the first three on the vomer, being those anterior to the blank space, are perhaps longer and more developed than any in the jaws. Two tubular orifices above the eyes, and two at the extremity of the snout. Eyes distant from the end of the snout twice their own diameter. Branchial orifice of the same size as the eyes. Three or four large pores arranged in a line along the edge of the upper jaw, but none apparent on the lower.

Dorsal fin thick and fleshy, and not very distinguishable from the body, excepting posteriorly, so that its exact point of commencement cannot be fixed with precision. Vent a trifle in advance of the middle point of the entire length. Anal fin still less distinguishable than the dorsal.

COLOUR.—“Fine dark purplish brown, with yellow circular spots.”—D.—The spots are mostly small, and many of them not bigger than large pin’s heads. They are smaller and more crowded about the head than elsewhere, giving a freckled appearance.

A *second specimen* is smaller than the above, measuring thirteen inches and a half in length. This specimen has the teeth more perfect. In the upper jaw, there is first an outer row reaching all round, in which the teeth are mostly small and regular, but towards the front mixed with some much longer ones; behind this, about the middle of the sides, is a short secondary row consisting of five or six teeth as long as those in front in the first row: in the lower jaw, the secondary row consists likewise only of four or five long teeth, but here they are placed in front instead of at the sides. Mr. Darwin’s notes respecting the colours of this smaller specimen are as follows: “Dark reddish-purple brown, with pale, or whitish-brown spots: eyes bluish.”

Habitat, Galapagos Archipelago.

The larger of the two specimens above described was taken by Mr. Darwin at Charles Island, the smaller one in tidal pools at Chatham Island, in the Galapagos Archipelago. It appears to be an undescribed species, though bearing much similarity to the *M. Meleagris* of Shaw.

## 2. MURÆNA OCELLATA.

Gymnothorax ocellatus, *Spix et Agass.* Pisces Brazil. p. 91. tab. 50 b.

FORM.—Head but moderately compressed. Snout rather short and blunt. Jaws equal. Gape reaching a little beyond the posterior part of the orbit. Teeth apparently in only a single row above and below, very strong and sharp at the extremity of the jaws: none at the anterior part of the vomer, but a few very short ones not easily seen at the back part of the median line of the palate. Two tubular orifices at the extremity of the snout, but above the eyes only two simple pores not prolonged into tubes. Eyes rather large, much exceeding in size the branchial orifice; scarcely more than one diameter between them and the end of the snout. Two or three large pores along the edges of both jaws. Dorsal very distinct, commencing above the branchial orifice. Vent a little before the middle. Tail gradually tapering to a rather fine point.

Length 12 inc. 9 lines.

COLOUR.—(*In spirits.*) Head and trunk brown, with round whitish spots. Dorsal and anal spotted with black and white, the black spots occupying the edge of the fin. Extremity of the tail imperfectly banded with white and dusky brown. Belly pale.

Habitat, Rio de Janeiro.

This elegant and well-marked species, first discovered by Spix on the Brazilian coast, was taken by Mr. Darwin in the harbour of Rio de Janeiro.

## 3. MURÆNA — ?

FORM.—Head moderately compressed, rising considerably at the nape. Body slender, somewhat ensiform behind, and tapering towards the tail. Snout of moderate length. Jaws equal, or the upper one perhaps a very little longer than the lower. Gape reaching as far behind the eye, as it advances before it. Teeth partially in two rows above, in one below; sharp and strong at the extremity of the jaws, and on the anterior part of the vomer. Two tubular orifices at the extremity of the snout, but only simple pores above the eyes. Three or four large pores along the edges of the upper and under jaws. Eyes distant one diameter and a half from the end of the snout. Dorsal distinct, commencing almost on the occiput, and in advance of the branchial orifice. Vent before the middle. Anal commencing a little behind it, and, like the dorsal, distinct, but rather less so.

	in.	lin.
Length . . . . .	10	0
Depth, fins not included . . . . .	0	6
From end of snout to branchial orifice . . . . .	1	4
From the same to vent . . . . .	4	3

COLOUR.—(*In spirits.*) Rather dark brown, nearly uniform, but here and there with lighter mot-tings. The lower jaw appears to have had a row of whitish spots encircling the pores.

The species of *Muræna* above described was taken by Mr. Darwin at Porto Praya, Cape de Verds. The individual being small, and possibly not having attained its permanent characters, I have forborne giving it any name, though I have not been able to identify it in the works of authors.



## 4. MURÆNA — ?

FORM.—Snout rather compressed before the eyes, not very long, and slightly obtuse. Upper jaw a very little in advance of the lower. The gape extends behind the eyes, but the posterior portion is not equal to the anterior. The teeth, tubular orifices, and pores, are very much the same as in the species last noticed. Dorsal very distinct, commencing in advance of the branchial orifice. Anal not so distinct as the dorsal.

Length 5 inc. 6 lin.

COLOUR.—Brown, but with some lighter specks and mottlings, more particularly on the lower jaw and on the fins.

Taken by Mr. Darwin at Tahiti. Probably a new species, but, as in the last case, the specimen is young and not easily determinable.

## LOPHOBRANCHII.

## FAMILY.—SYNGNATHIDÆ.

## 1. SYNGNATHUS ACICULARIS. Jen.

PLATE XXVII. fig. 3.

*S. flavo-brunneus*: corpore gracillimo, compresso, heptagono; caudâ quadrangulâ: vertice plano; cristâ occipitali parum conspicuâ; rostro longo, compresso, verticaliter capite angustiore, margine superiore acuto prope recto: pinnâ dorsali totâ multum ante medium longitudinis sitâ; pinnis pectoralibus parvis, anali minutissimâ, caudali distinctâ.

LONG. unc. 5. lin. 10.

FORM.—Very similar to the *S. Acus*, but the body rather more compressed. The angles are the same, and the middle lateral ridges of the trunk rise upwards in a similar manner to terminate behind the dorsal fin. There are about seventy transverse shields or plates in the whole length, eighteen of which lie between the gills and the vent. Head much compressed about the gills, contained with the snout about eight and a half times in the entire length. Crown nearly flat, with very little of an occipital ridge; profile falling obliquely, but not much out of a straight line; between the eyes a slight hollow. Snout elongated, a trifle more than half the entire length of the head, compressed, the upper edge sharp and nearly horizontal in front of the nostrils, vertically much narrower than the head.

The dorsal commences at one-third of the entire length, and occupies a space about one-tenth of the same, terminating before the middle: the number of rays is about forty or more. Vent about underneath the seventh dorsal ray. Anal extremely minute, of only one or two rays. Pectorals very small. Caudal distinct, much as in *S. Acus*.

COLOUR.—(In spirits.) Of a nearly uniform yellowish brown, paler underneath.

Habitat, Valparaiso.

This species, taken by Mr. Darwin at Valparaiso, would seem to represent in that quarter of the globe the *S. Acus* of the European seas, which, on the whole, it much resembles, though there are several slight differences on a close comparison. It is a female specimen, being without the abdominal pouch, and is probably not full-sized. The dorsal fin being a little injured, and the rays very delicate as well as close-set, it is hardly possible to tell the exact number. The anal exists, but it is so extremely minute that it might easily be overlooked.

## 2. SYNGNATHUS CONSPICILLATUS. Jen.

PLATE XXVII. fig. 4.

*S. griseus*, fasciis transversis fuscis; genis albicantibus, vittis duabus angustis longitudinalibus nigro-fuscis: corpore crassiore, subcylindrico, hexagono; caudâ quadrangulâ: vertice elevato; cristis occipitali et nuchali distinctis: oculis magnis pro-



*minulis: fronte declivi, in descensu sinuato: rostro brevi, gracillimo, subcylindrico: pinnâ dorsali paulo ante medium longitudinis desinenti: ano infra radium primum dorsalem sito: pinnis pectoralibus parvis, anali minutissimâ; caudali distinctâ.*

D. 31; A. 3?; C. 10; P. 14.

LONG. unc. 4. lin. 7.

FORM.—Body rather thick and somewhat cylindrical; the greatest depth and thickness nearly equal, the former being about one-twenty-seventh of the entire length. From the head to the vent hexagonal, the middle lateral ridges terminating abruptly, when opposite the commencement of the dorsal fin, without inclining either upwards or downwards. Fifteen transverse plates between the gills and the dorsal fin: only fifty-four in all, the tail not tapering so much as in many other species. Head much pinched in at the gills, but rather full and protuberant about the cheeks: its length ten and a half times in the entire length. Crown high and convex: a ridge commencing at the occiput passes backward to the nape. Eyes large and full, with somewhat of a spectacled appearance; their diameter equal to the whole depth of that part of the head; the orbits rising in ridges above them, with the intervening space concave. From between the eyes the profile descends in a sinuous curve to the base of the snout, which is short, slender, very narrow, and almost cylindrical. The length of the snout is less than half the entire length of the head; its breadth, vertically, only one-third the depth of the same taken behind the eyes.

The dorsal commences beyond one-third of the entire length, occupies one-ninth of the same, and terminates a little before the middle: nearly even, and rather high, more than equalling the depth of the body underneath. Vent about underneath the first ray, but almost in advance of the dorsal fin altogether. Anal extremely minute. Pectorals very small. Caudal rays distinct.

COLOUR.—Trunk greyish-brown, with deep brown interrupted transverse fasciæ. In front of the dorsal, the fasciæ terminate at the middle lateral ridge, below which the sides are spotted. Dorsal fin also a little spotted. Cheeks whitish, with two very distinct narrow longitudinal vittæ extending backwards from the eyes to the posterior part of the opercle.

Habitat, Tahiti.

A well-marked species, and apparently undescribed. The only specimen in the collection is a female, and, like the last, perhaps not full-sized.

### 3. SYNGNATHUS CRINITUS. Jen.

PLATE XXVII. fig. 5.

*S. griseus; ventre, et maculâ operculari, nigricantibus: corpore crassiore, antice heptagono, postice quadrangulo, angulis acutis: vertice parum elevato; cristis occipitali et nuchali distinctis: rostro brevissimo, subcylindrico, capite angustiore, postice supra carinato, apice subrecurvo: cirris duobus, minutis, filamentosis, palpebralis: pinnâ dorsali paulo ante medium longitudinis desinente; ano infra initium ejus sito: pinnis pectoralibus et caudali parvis; anali nullâ.*

LONG. unc. 3. lin. 5.

FORM.—Body thickish, the greatest depth and thickness nearly equal, the former about one-twenty-fifth of the whole length. From the head to the vent heptangular; tail quadrangular: all the angles sharp and distinctly marked. The middle lateral ridges in the heptangular portion pass downwards at their extremities to terminate at the vent. Sixteen transverse plates before the dorsal: only fifty-two in the whole length. Head short, about one-eleventh of the entire length, not more compressed than the body. Crown not much elevated, but with distinct occipital and nuchal ridges. Orbits rising in ridges above the eyes, the interocular space being hollowed out: also a ridge commencing between the eyes, and passing forwards along the base of the snout, but not reaching to its extremity. Snout itself very short, its length only one-third the entire length of the head, narrower than the head vertically, nearly cylindrical, the tip slightly recurved. A few very short minute filamentous threads scattered about the head, more particularly one over each eye.

Dorsal placed much as in the last species, and terminating a little before the middle; the rays delicate and not easily counted, about twenty. Vent beneath the commencement of the dorsal. No anal distinguishable even under a lens. Pectorals very small. Caudal moderately distinct.

COLOUR.—Grey: a spot on the gill-cover, and the belly, dusky. The carinæ which form the edges of the under surface of the body are darker still, and shew a fine dark line on each side extending to the caudal.

Habitat, Bahia Blanca, Northern Patagonia.

Apparently another new species of this genus, taken by Mr. Darwin at Bahia, and, like the last, well-marked; especially by the short filaments above the eyes, which I am not aware occur in any other known species.



## PLECTOGNATHI.

## FAMILY.—TETRODONTIDÆ.

1. DIODON NYCTHEMERUS. *Cuv.*

*Diodon nycthemerus*, *Cuv.* Mém. du Mus. tom. iv. p. 135. pl. 7.

A species of *Diodon* in Mr. Darwin's collection, the number attached to which has been lost, and of which the locality is in consequence unknown, appears referable to the *D. nycthemerus* of Cuvier.

The spines are long, measuring three quarters of an inch in length; round, sharp, and not very close together. There are five in the front row between the eyes, seven in a transverse row between the pectorals, and ten or eleven between the snout and the dorsal in a longitudinal one: none exactly on the upper part of the tail, but one on each side of the base of it, a little below the termination of the dorsal fin, and a corresponding pair still lower down. The spines on the belly are shorter, and rather closer together than those on the back. One of those on the back in this specimen is accidentally forked.

The true teeth appear on the surface of the jaws like minute scales, as in several species of the genus *Scarus*.

The fin-ray formula is as follows:

D. 13; A. 13; C. 9; P. 20.

Length 5 inches 6 lines.

The colours, so far as can be judged, the specimen being in spirits and not in very good condition, answer to Cuvier's description of them with tolerable exactness.

2. DIODON RIVULATUS. *Cuv.*

*Diodon rivulatus*, *Cuv.* Mém. du Mus. tom. iv. p. 129. pl. 6.

An individual apparently of this species was picked up by Mr. Darwin on the shore of the Rio Plata at Maldonado. It agrees with Cuvier's description, excepting that the undulating lines are not visible, probably owing to the state of the specimen when found.

The spines are short, barely a quarter of an inch in length, but very strong, compressed, and resembling canine teeth. There are three in the first row between the eyes; about six in a transverse row across the back, and seven or eight in a longitudinal one. Beneath they are shorter and more numerous. The orbits are elevated in ridges, and project forwards over the eyes. Two very small barbules attached to the lower lip. Surface of the jaws smooth, the teeth not appearing as scales.

D. 11; A. 10; C. 8; P. 22.

Length 5 inc. 3 lin.

As Cuvier observes, the *D. geometricus* of Bl. and Schneid.\* approaches very closely this species, and I can hardly think it to be distinct. Yet neither in Mr. Darwin's specimen, which in all other respects agrees exactly with Schneider's figure, do I discern any appearance of the hexagonal meshes on the surface of the body.

3. DIODON ANTENNATUS. *Cuv.?*

*Diodon antennatus*, *Cuv.* Mém. du Mus. tom. iv. p. 131. pl. 7.

A third species of *Diodon*, brought home by Mr. Darwin, and taken by him at Bahia, in Brazil, is either the young of the *D. antennatus* of Cuvier, or else new; but the only individual in the collection is quite small, and not more than an inch in length, excluding caudal. The fleshy filaments above the eyes, which, according to Cuvier, so peculiarly distinguish the *D. antennatus*, are very distinct,—but I see none on the sides. The ground colour would seem darker than he describes, so as to render the spots and markings on the upper parts not distinguishable from it now, if they ever existed. In spirits it appears of a nearly uniform deep brown red. The spines, or rather papillæ, are also shorter than represented in his figure; but this may be only the effect of immaturity.

According to Mr. Darwin, the colours when recent were as follows:—"Above blackish brown, beneath spotted with yellow. Eye with the pupil dark blue; iris yellow, mottled with black." It is added:—"On the head four soft projections; the upper ones longer, like the feelers of a snail."

Mr. Darwin observes, "that the dorsal, caudal, and anal fins, in this species, are so close together that they act as one: these, as well as the pectorals, are in a continued tremulous motion even when the fish is otherwise motionless. The animal propels its body by using the posterior fins in the same manner as a boat is sculled, that is, by moving them rapidly from side to side with an oblique surface exposed to the water. The pectoral fins have great play, which is necessary to enable the animal to swim with its back downwards."

Mr. Darwin made some further observations on the habits of this species, which have already appeared in his "Journal," to which I may refer the reader.† The tendency of them is to explain the process by which the water and air are absorbed, when the *Diodon* distends itself into a spherical form; and to show that the fish *can* swim, when floating in this state with its back downwards, which Cuvier doubted. He thinks that the water is taken in partly for the sake of regulating its specific gravity. He also notices a curious circumstance with respect to this species, viz., "that it emitted from the skin of its belly, when handled, a most beautiful carmine red and fibrous secretion, which permanently stained ivory and paper."

\* *Syst. Ichth.* pl. 96.

† pp. 13, 14.



1. TETRODON AEROSTATICUS. *Jen.*

*T. capite, dorso, lateribus, et pinnâ caudali, nigro-maculatis; ventre turgidissimo, fasciis obliquis nigris: corpore undique muricato, caudâ solum exceptâ: capite brevi; fronte inter oculos paululum depresso: maxillis æqualibus: lineâ laterali nullâ: pinnâ dorsali omnino ante analem positâ: pinnâ caudali subrotundatâ.*

D. 11; A. 10; C. 10; P. 11.

LONG. unc. 2. lin. 6.

FORM.—Head short. Body approaching to globular, with the skin of the belly extremely loose and capable of great inflation; every where beset with minute prickly asperities, the extreme end of the tail alone excepted. Crown nearly flat, very slightly depressed between the eyes. Jaws equally advanced. Nostrils tubular. No appearance of any lateral line. Dorsal entirely in advance of the anal: both these fins small. Caudal slightly rounded.

COLOUR.—(*In spirits.*) Head, back, and sides to the depth of the pectorals, greyish brown, spotted with black; the spots very small and crowded on the back, but becoming larger on the flanks and tail. Belly white, with deep black oblique broad bands, inosculating in some places, so as to form large meshes. Dorsal, anal, and pectorals, plain; but the caudal very elegantly and distinctly spotted.

The ticket attached to this specimen has been lost, and its locality is in consequence unknown. In general appearance, it very much resembles the *T. lineatus* of Bloch, of which it may possibly be a variety; but it would seem to differ from that species, in having the forehead less elevated; in wanting the lateral line altogether, of which I can discover no trace; and in having the whole back and upper part of the sides spotted, and not merely the tail and its fin, as is represented in the *T. lineatus*.

2. TETRODON IMPLUTUS. *Jen.*

*T. sordidè metallico-olivaceus, maculis circularibus albis; ventre albo, lineis olivaceis longitudinalibus, haud admodum turgido: corpore suboblongo, magnâ ex parte lævis-simo, ventre solum muricato: maxillis subæqualibus: naribus tubulosis, bifurcatis: lineâ laterali distinctâ, parum tortuosâ: pinnâ dorsali anali paulo anteriore: pinnâ caudali æquali.*

D. 10; A. 10; C. 11; P. 16.

LONG. unc. 4. lin. 9.

FORM.—Approaching to oblong, the belly a little ventricose. Head not so short as in the last species, nor yet much produced. Body every where smooth, excepting the middle of the abdomen from beneath the pectorals to the vent, and not very prickly here. Top of the head slightly depressed between the eyes. Jaws nearly equal; the upper one, if any thing, a very little in advance. Nostrils tubular, the tubes forked from the bottom into two equal branches.

The lateral line, which is very distinct, commences behind the mouth, whence it passes under and partly encircles the eye, then arches upwards, making a long sweep, and not descending till it gets above the anal, whence it proceeds nearly along the middle towards the caudal, but loses itself before attaining to that fin. Dorsal fin rather in advance of the anal. Caudal square.

COLOUR.—“Dirty metallic olive-green, with white circular spots; belly white, with streaks of the same colour as the back.”—D. The spots extend on to the basal half of the caudal, but are smaller here than on the body. A white annulus encircles each eye, and a similar one is described round the base of each pectoral. The abdominal streaks run very exactly parallel with the axis of the body, not obliquely as in the last species.

Habitat, Keeling Islands, Indian Ocean.

I can find no species noticed by authors exactly corresponding with the one described above, which was obtained by Mr. Darwin at the Keeling Islands. The form is similar to that of the *T. Honckenii* of Rüppell,\* but the colours appear different. On the other hand, the markings resemble those of the *T. testudineus* of Bloch, but that species is rough all over.

3. TETRODON ANNULATUS. *Jen.*

*T. dorso et lateribus nigro-fuscis, maculis circularibus atris; infra niveus: corpore oblongo, haud admodum ventricoso, ubique sed parçè muricato, rostro et caudâ exceptis: capite grandiusculo, spatio interoculari lato, parum depresso: maxillis subæqualibus: naribus cylindraceis, recumbentibus, aperturis duabus lateralibus: lineâ laterali in capite tortuosissimâ: pinnâ dorsali vix anali anteriore: pinnâ caudali æquali.*

D. 8; A. 7; C. 9, &c.; P. 15.

LONG. unc. 9.

FORM.—Oblong: head rather large; the snout a little more produced than in the last species.

Moderately ventricose, and apparently capable of a certain degree of inflation. No where perfectly smooth, except on the snout, tail, and here and there on the flanks; nor very rough; the prickles being minute and rather scattered, most apparent on the back, nape, (whence they advance to quite between the eyes,) and the middle of the abdomen. The interocular space is broad, equalling two and a half diameters of the eye at least, and a little hollowed out. Jaws nearly equal, the upper one perhaps a very little in advance. Nostril in the form of a small recumbent cylinder, with an opening at each extremity. Dorsal very little in advance of the anal; the first ray in each of these fins very short. Caudal square.

The lateral line is very tortuous, especially about the head. It commences at the bottom of the gill-cover, whence it ascends vertically behind the eye towards the crown, then passes over the eye towards the snout, descends again beneath the nostril to form a great loop in front of the eye, almost reaching to the corners of the mouth, whence it returns beneath the eye,

\* Surely this cannot be the same as the *T. Honckenii* of Bloch?



and, crossing its former course nearly at right angles, proceeds along the upper part of the side, getting lower as it approaches beneath the dorsal, to terminate at the caudal. There are also two short transverse lines; one across the snout, connecting the loops; another across the nape, connecting the two main lines after they have assumed the usual direction.

COLOUR.—“Beneath snow white. Above dark brownish-black, this colour forming a series of broad oval rings, one within another; the outer and largest ring includes nearly the entire surface of the back and sides. The upper surface is, in addition, marked with round spots of a darker shade. Pectoral and dorsal fins yellowish brown. Iris, inner edge clouded with orange; pupil dark green-blue.”—D.—In its present state, there is no indication of the rings noticed above. The spots, which are small, and cover nearly the whole head, back, and sides, appear also sparingly on the basal half of the caudal, but not on any of the other fins.

Habitat, Galapagos Archipelago.

This species was taken by Mr. Darwin at Chatham Island, in the Galapagos Archipelago. He observes in his notes that it makes a loud grating noise. It is remarkable for the great tortuosity of the lateral line. The form of the nostrils is also rather peculiar.

#### 4. TETRODON ANGUSTICEPS. *Jen.*

PLATE XXVIII.

*T. supra obscure viridis: capite oblongo, subcompresso, spatio interoculari multum contracto: corpore infra ventricosum, ubique lævissimo, duobus, in summo dorso, cirris cutaneis parvis adornato: maxillis subæqualibus: naribus tubulosis, indivisis, aperturis duabus lateralibus: lineâ laterali in capite tortuosissimâ: pinnâ dorsali omnino ante pinnam analem; caudali æquali.*

D. 8; A. 7; C. 9; P. 15.

LONG. unc. 9. lin. 3.

FORM.—Rather more elongated than the last species; especially in regard to the head, which is also more compressed upwards, reducing the space between the eyes to a narrow channel, much hollowed out, and not exceeding one diameter of the eye. Body inflatable, every where quite smooth. Jaws nearly equal, the upper one perhaps a very little in advance. Nostrils tubular, with two lateral apertures, somewhat similar to those of the last species, but more elevated. Lateral line similar, taking the same windings on the head. A little behind the transverse line on the nape, and nearly above the attachment of the pectoral, are two small skinny appendages: there is also a very minute one on each side of the tail, but none elsewhere. Dorsal wholly before the anal. Caudal square.

COLOUR.—“Above dull green: base of the pectorals and dorsal black; a white patch beneath the pectorals.”—D.—The colours must have very much altered from the action of the spirit, as it now appears of a nearly uniform reddish brown, only paler beneath.

Habitat, Galapagos Archipelago.

Another apparently undescribed species of this genus, taken by Mr. Darwin at the same place as the last. He observes in his notes that it is inflatable.

#### FAMILY.—BALISTIDÆ.

##### 1. BALISTES VETULA. *Bl.*

*Balistes Vetula*, *Bloch*, *Ichth.* tab. 150.

————— *Duperrey*, (*Voyage*) *Zoologie*, p. 114, pl. 9. fig. 2.

FORM.—Body deep, subrhombic, very much compressed; the greatest depth equalling half the entire length. Tail unarmed. Three or four larger scales than the others behind the branchial orifice. Pelvic bone projecting, prickly, connected with which is a fin consisting of about nine pairs of short rays. Above this fin, and parallel to its base, are two or three rows of short spines, but not much developed. First dorsal of three spines, commencing above the pectoral; first spine very strong and rough, the third not much smaller than the second. Second dorsal, and anal, which answer to each other, nearly even throughout, the anterior rays not being prolonged beyond the others. The caudal is injured, and its exact form cannot be determined. No lateral line.

D. 3—30; A. 27; C. 12; P. 14.

Length 1 inc. 10 lin.

COLOUR.—(*In spirits.*) Yellowish grey, becoming paler beneath. Three or four dark transverse streaks across the head from eye to eye: beneath the eye one or two indistinct streaks, passing off towards the branchial orifice: also two very distinct longer ones commencing on the upper part of the snout before the eyes, and passing obliquely across the cheeks towards the roots of the pectorals, parallel to those last mentioned. Besides the above, there are several obliquely transverse interrupted lines on the sides of the body: in one specimen, these lines are not well defined; in another, they are distinct, but so much interrupted as to have the appearance of spots arranged in a linear series. Two or three transverse lines encircling the tail; and some remains of longitudinal stripes on the second dorsal and anal fins.

The above description is that of two very small specimens of a species of *Balistes* taken by Mr. Darwin in Lat. 14° 20' South, Long. 38° 8' West, about sixty-five miles from land. I have very little doubt of their being the young of the *B. Vetula* of *Bloch*. The only respects in which they appear to differ from that species are the oblique lines on the back being carried completely across the sides in the form of lines of spots, and the anterior portions of the second dorsal and anal fins not being prolonged in a point; but both these differences may be the effect of immaturity.

##### 2. BALISTES ACULEATUS. *Bl.*

*Balistes aculeatus*, *Bloch*, *Ichth.* tab. 149.

————— *Benn.* in *Zool.* of *Beechey's Voy.* p. 69. pl. 22. f. 2.

FORM.—Body deep, subrhombic. Tail armed with three rows of prickles, eleven in the uppermost row, about nine or ten in the middle one, and five or six in the lowermost. A few larger scales than the others behind the branchial orifice. Pelvic bone very rough and prickly, the



spines that follow short, and not protruding much beyond the skin. First spine in the dorsal very strong, aculeated at the anterior edge, but not at the sides; no third spine in this fin. Second dorsal and anal even. Caudal rounded.

D. 2—24; A. 21; C. 12; P. 13.

Length 2 inc. 3 lin.

COLOUR.—Not noticed in the recent state. The ground colour has probably been altered by the spirit, but the markings are still very distinct, and accord tolerably with Bloch's figure, except that the oblique bands on the posterior part of the body, in front of and above the anal, are darker; while they alternate with four white ones, which are particularly conspicuous. Possibly these white bands may have been originally blue, as the narrow stripes descending from the eyes to the pectorals, which evidently were of that colour, are nearly faded to a white. There is also a white stain on each side of the tail, where the spines are, which appears to have been blue originally: the spines themselves are deep shining black.

This specimen shows the black transverse bands between the eyes, and the broad band passing from the eye to the pectoral, between the narrow blue ones above alluded to, all represented by Bloch, but not observed by Mr. Bennett in the specimen figured in the "Zoology of Beechey's Voyage."

Habitat, Tahiti.

The above specimen was taken by Mr. Darwin at Tahiti. It is quite small, and differs in some respects from the figures of Bloch and other authors, but it is evidently referable to the *B. aculeatus*. The species is probably subject to variation in respect of colouring.

#### 1. ALEUTERES MACULOSUS. *Richards.*

*Aleuterus maculosus*, *Richards.* in Proceed. of Zool. Soc. 1840. p. 28.

FORM.—Oval, somewhat approaching to fusiform behind, very much compressed. The greatest depth one-third of the entire length. Skin covered with little granular points, terminating in very minute bristles, and communicating a slight roughness to the touch, when the finger is passed from tail to head. Snout rather prominent and acute: jaws equal. Dorsal spine springing from above the middle of the orbit of the eye; strong, with four rows of sharp prickles at the four angles, pointing downwards, and very regularly set: second dorsal spine very minute. The second dorsal and anal fins have been lost in this specimen, and their form and number of rays cannot be determined. The pectorals are small, each with twelve rays. Caudal rounded, also with twelve rays.

Length 5 inc. 4 lines.

COLOUR.—"Mottled with pale blackish green, leaving white spots."—D.—In its present state, the skin is nearly gone from long maceration in impure spirit: such portions as are left accord well with Dr. Richardson's description, appearing of a mouse-grey, with darker mottlings. There are three or four rather indistinct dark *asciæ* across the caudal.

Habitat, King George's Sound.

I have scarcely any doubt of this being the *A. maculosus* described by Dr. Richardson, in his recently published notes on a collection of fishes from Van Diemen's Land. Mr. Darwin's specimen, which is in bad condition, was obtained by him in King George's Sound.

#### 2. ALEUTERES VELUTINUS. *Jen.*

*A. pallide fuscescens, fasciis quatuor obscurioribus, longitudinalibus, indistinctis; pinnis pallide aurantiis: corpore oblongo-ovali elongato; cute delicate hispida, scabra: rostro producto, apice obtuso: spina dorsali aculeis lateralibus deflexis, uniseriatis: pinnis dorsali secundâ et anali multum ante caudalem desinentibus.*

D. 2—33; A. 31; C. 12; P. 13 vel 14.

Long. unc. 8.

FORM.—Elongated, approaching to oblong-oval, the tail rather slender. Greatest depth exactly one-fourth of the entire length, and equalling the length of the head, this last being measured to the upper angle of the oblique branchial orifice. Back slightly arched, the curvature rather exceeding that of the belly. Profile in front of the dorsal spine falling very gradually, and not much out of the rectilinear. Snout considerably produced, but blunt at the extremity. Mouth small; jaws equal; teeth strong, and very sharp. Eyes round, placed exactly above the branchial orifice. The grains on the skin are coarser than in the *A. maculosus*, and the bristles springing from them longer and more developed, especially on the posterior part of the body, communicating a harsher feel to the touch: these bristles are slightly hooked at their extremities, the tips being turned towards the tail.

Dorsal spine strong, situate above the posterior part of the orbit, with only two principal rows of prickles, one on each of the two lateral edges; anteriorly granulated at bottom, with a few rudimentary prickles towards the apex, but posteriorly almost quite smooth. Second spine very minute. The distance from the first spine to the commencement of the second dorsal fin equals twice the length of that spine. The anal commences under the fifth dorsal ray, and ends nearly in a line with the termination of that fin, but extends a trifle further. Both fins fall short of the caudal by a considerable space. Pectorals rather small. The caudal is worn at the end, but appears to have been either square or slightly rounded.

COLOUR.—"Very pale brown: fins pale orange."—D.

A second specimen is smaller than the above, measuring six inches and three-quarters in length. It is exactly similar in respect to form, and general colour; but the sides are marked with four tolerably distinct longitudinal bands, extending from the branchial orifice to the caudal, rather darker than the ground on which they are traced. There is very little indication of these bands in the first specimen.

Habitat, King George's Sound.

This species was taken by Mr. Darwin in King George's Sound, and appears to be new. It has some points of resemblance with the *Balistes Ayraud* of Quoy



and Gaimard, but in that the dorsal fin is said to extend to the caudal,\* which is far from being the case here. I have named it *velutinus*, in respect of the minute bristles which cover the skin, somewhat resembling the pile of velvet.

OSTRACION PUNCTATUS. *Schn.*

L'Ostracion pointillé, *Lacép.* Hist. Nat. des Poiss. tom. i. p. 455. pl. 21. fig. 1.

Ostracion punctatus, *Schneid.* Syst. Ichth. p. 501.

———Meleagris, *Shaw*, Nat. Misc. pl. 253.

This well-marked species of Ostracion, first described by Lacépède from Commerson's MSS., and afterwards figured by Shaw, in his "Naturalist's Miscellany," under the name of *O. Meleagris*, was obtained by Mr. Darwin at Tahiti, where it had been previously observed by Captain Cook.

There are two specimens in the collection, both exactly similar, and of the same size, measuring a trifle more than three inches and a half in length. They also accord well with Shaw's figure. Lacépède, in his description, speaks of the anal fin as being more extended than the dorsal, and as having eleven rays; but in both Mr. Darwin's specimens, I find the number of rays in these two fins the same. The formula is as follows:

D. 9; A. 9; C. 8; P. 10.

Schneider has noticed this species twice; first under the name of *lentiginosus*, and again under that of *punctatus*.

\* This character, though mentioned in the description, is not, however, represented in the figure. See *Freyinet's Voyage (Zoologie)*, pl. 47. f. 2.

CYCLOSTOMI.

FAMILY.—PETROMYZONIDÆ.

MYXINE AUSTRALIS. *Jen.*

FORM.—Scarcely differing from the *M. glutinosa*, but apparently rather more slender in proportion to its length. Mouth and cirriform appendages the same. Branchial orifices two, very near together, placed beneath, at a little beyond one-fourth of the entire length. A very conspicuous row of pores along each side of the abdomen. The tail seems somewhat sharper than in the *M. glutinosa*, and the rays of the low fin which turns round its extremity rather more distinct. Vent distant from the end of the tail rather less than one-eighth of the entire length.

Length 11 inc. 6 lin.

COLOUR.—"Above coloured like an earth-worm, but more leaden; beneath yellowish; head purplish."—D.

Habitat, Tierra del Fuego.

Mr. Darwin obtained this species by hook amongst the kelp, in Goree Sound, and other parts of Tierra del Fuego, where he observes it is abundant amongst the rocky islets. Its extreme southern locality would suggest the idea of its being distinct from the *M. glutinosa* of the northern seas; yet the differences between the two, upon comparison, are very slight, and, if it really be so, as I have ventured to consider it, it requires an examination of more specimens to lay down its exact specific character.

Mr. Darwin has made some interesting remarks on the habits of this fish. He observes that it is "very vivacious, and retained its life for a long time; that it had great powers of twisting itself, and could swim tail first. When irritated, it struck at any object with its teeth; and by protruding them, in its manner, much resembled an adder striking with its fangs. It vomited up a *Sipunculus* when caught." He adds, that he "observed a milky fluid transuding through the row of lateral pores."



## APPENDIX.

THE following Appendix contains descriptions of a few species, which were omitted to be noticed in their proper places; and further remarks with respect to some, which will be found in the body of the work.

## FAMILY.—PERCIDÆ.

1. APHRITIS UNDULATUS. *Jen.*

PLATE XXIX. fig. 1.

*A. elongatus*: lateribus supra pallide olivaceis, fasciis transversis abbreviatis, lineisque longitudinaliter undantibus, nigris; lateribus infra argenteis: pinnis dorsalibus et caudali punctatis; pinnis, reliquis, et lineâ laterali, albidis.

B. 6; D. 8—25; A.  $1/22$ ; C. 14, et 6 brevioribus; P. 22; V.  $1/5$ .

LONG. unc. 3. lin. 1.

FORM.—Elongated; the depth about one-sixth of the entire length; the thickness two-thirds of the depth. Head four-and-a-half times in the length. Profile falling very gradually at first, but more rapidly in advance of the eyes, causing the snout to appear rather obtuse. Mouth small: maxillary slender, hardly reaching to a vertical line from the anterior margin of the orbit: upper jaw slightly longer than the lower, and very protractile. Teeth very minute, forming a narrow velutine band: a patch on the chevron of the vomer scarcely visible, but capable of being very distinctly felt; none apparent on the palatines. Eye one-fourth the length of the head, and distant one diameter from the end of the snout; the interocular space rather less than the diameter. Snout slightly indented, or furrowed out in front of the eyes. A series of impressions on the lower jaw, and along the limb of the preopercle, but much less obvious than in the next species, and not distinctly porous. Preopercle with the ascending margin vertical, the angle at bottom rounded; the limb broad and distinctly marked, with the boundary line between it and the cheek slightly elevated into a ridge. The opercle, with its membrane, produced backwards in an angle, the subopercle being visible beneath. The branchial membrane six-rayed, and fastened to the isthmus underneath, the aperture commencing beneath the ascending margin of the preopercle.

Lateral line commencing at the upper angle of the gill-opening, and following the curvature of the back at one-fourth of the depth, and preserving this direction throughout its course, not

falling to the middle before losing itself in the caudal. Scales small, covering the whole head and body, except the snout in front of the eyes, the jaws, and the limb of the preopercle. The free portion of each scale marked with several small concentric circles, the free edge finely ciliated: the basal portion with a fan of seven striæ, and the spaces between these deeper striæ with minuter striæ running transversely: the basal margin cut square.

Pectorals attached rather low down, and a little posterior to the terminating angle of the opercle; their length about three-fourths that of the head: the fourth to the eighth rays longest; the first ray only half the length of the second; the first two, and the last three or four, simple; the rest branched. Ventrals about four-fifths the length of the pectorals, and in advance of those fins by nearly half their own length; their spine very distinct. First dorsal short, commencing immediately above the insertion of the pectoral: all the spines very slender, with the intervening membrane delicate; the second longest, equalling about half the depth; the third and following ones gradually decreasing. Second dorsal long, separated from the first by a very small interval, and occupying a space just equal to the distance between its commencement and the end of the snout: the rays gradually decreasing in length from the anterior ones, which equal three-fourths of the depth; all simple, or if branched, only so at their extreme tips. The interval between the second dorsal and the caudal contained eight-and-a-half times in the entire length. Anal commencing under the sixth ray of the second dorsal, or exactly at the middle point of the entire length, caudal excluded; extending a trifle beyond the second dorsal, but in other respects answering to that fin. Caudal square when spread, but very slightly notched when the rays are close; contained six-and-a-half times in the entire length; the principal rays branched.

COLOUR.—(*In spirits.*) Back and upper half of the sides pale olivaceous, with about seven or eight abbreviated, transverse, dusky fasciæ; beneath these are two irregular lines undulating longitudinally in a zig-zag manner, and having rather a tendency to meet at the angles, so as to form a connected longitudinal chain of diamond-shaped links. Lower portion of the sides and abdomen silvery. Tubal pores of the lateral line white, making this line very evident. Dorsal and caudal fins speckled with small dusky spots and points. Pectorals, ventrals, and anal, quite plain, and whitish.

A second specimen in the collection exactly resembles the above, except in being not quite so large, and in having a ray less in each of the two dorsal fins.

Habitat, Chonos Archipelago, W. coast of S. America.

The genus *Aphritis* was first established by M. Valenciennes, in the appendix to the eighth volume of the “Histoire des Poissons,” for the reception of a small Percoid fish obtained by MM. Quoy and Gaimard in Van Dieman’s Land, inhabiting fresh-water. The species above described, which was taken by Mr. Darwin in Lowe’s Harbour, South of Chiloe, appears to be referable to the same genus. It differs, however, in many respects from the *A. Urvillii*, the only one which Valenciennes has noticed. The relative situation of the first dorsal with respect to the pectorals, and of the anal with respect to the second dorsal, is different: there are fewer rays in the anal, and more in the second dorsal: the upper, instead of the lower jaw, as represented in Valenciennes’s figure, is



rather the longest; neither can I discern any teeth on the palatines, though there is a patch of very minute ones in front of the vomer.

That this species really belongs to *Aphritis*, would seem indicated not merely by the aggregate of its external characters, but by the internal structure also, which was examined in one of the two specimens brought home by Mr. Darwin, and found conformable to what is stated by Valenciennes, in this respect, of the *A. Urvillii*. The stomach is large, with four very distinct cæcal appendages, and there is no air-bladder.

The *A. undulatus*, which I have so named in reference to the undulating longitudinal lines on the sides, is very Cypriniform in general appearance, and not altogether unlike the common minnow, *Cyprinus Phoxinus*.

## 2. APHRITIS POROSUS. Jen.

*A. brevior*: pallide olivaceus, lateribus fasciis transversis obsoletis nigricantibus; pinnis omnibus brunneis: maxillâ inferiore, et limbo preoperculi, poris conspicuis circiter novem, suborbitalibus circiter quinque, seriatim dispositis.

D. 8—25; A. 1/22; C. 14, &c.; P. 23; V. 1/5.

LONG. unc. 2. lin. 5.

FORM.—Not so much elongated as the last species: the depth rather more than one-sixth of the entire length, and the head only four times in the same. Also distinguished by a row of large mucous pores on the lower jaw, passing upwards posteriorly, and continued along the limb of the preopercle: the number of these pores on each side is nine or ten: a row of similar pores, amounting to about five, passes backwards from a little above the end of the maxillary beneath each eye. In other respects, the form is similar to that of the last species, excepting that the interval between the second dorsal and the caudal is only one-eighth of the entire length, in consequence of the body being less elongated.

COLOUR.—(*In spirits*). Back and upper half of the sides, olivaceous brown; beneath silvery. No very obvious markings; but traces may be seen of six or seven transverse dusky fasciæ, reaching from the back to a little beneath the lateral line, which were probably more distinct in the recent state. All the fins brownish; the dorsal a little powdered with dusky specks. The fourth and fifth rays of the ventrals are white, and appear to have been always of a different colour from the rest of the fin.

Habitat, Coast of Patagonia.

This appears to be another new species of *Aphritis*, taken by Mr. Darwin on mud-banks, in Port Desire, central Patagonia. It is very closely allied to the *A. undulatus*, but, I conceive, certainly distinct. There is but one specimen in the collection.

## FAMILY.—SCORPÆNIDÆ.

### APISTUS — ?

Mr. Darwin's collection contains a species of this genus procured in King George's Sound, New Holland, which, from the bad state of preservation of the specimen, it is scarcely possible to identify with certainty. Possibly it may be new, as it does not seem to accord very exactly with any of those described in the "Histoire des Poissons;" but I shall not consider it such, nor do more than point out a few of its more obvious characters.

It is not determinable, whether it was originally one of the naked species of this genus, or whether the scales have been rubbed off, but probably the former. The suborbital and preopercular spines are strong, and considerably developed: the former reaches back further than the maxillary, and nearly to the posterior part of the orbit, and has another very small spine at its base. The lower jaw advances beyond the upper. The head is about one-third of the entire length. The eyes are large, their diameter being contained about three and a half times in the length of the head. The dorsal commences in a line with the ascending margin of the preopercle. The first spine is half the length of the second; the second is a little shorter than the third, which is longest, and equals two-thirds of the depth of the body; the fourth and succeeding ones decrease very gradually; the soft portion of this fin is a little higher than the hinder part of the spinous. The first anal spine is rather more than half the length of the second, which is the strongest of the three, though not much longer than the third. The pectorals are rather pointed, and a little shorter than the head. The ventrals are attached a little behind the pectorals, and are not very much shorter than those fins.

The following is the fin-ray formula:

D. 13/9; A. 3/6; C. 11, &c.; P. 11; V. 1/5.

Length 4 inches 6 lines.

The species to which this approaches nearest would seem to be the *A. niger* of Cuvier and Valenciennes; but there is no appearance of the small elevations on the skin resembling hairs, which those authors mention in their description of this last, and, on the whole, I am inclined to consider it as distinct.

### AGRIOPUS HISPIDUS. p. 38.

Notwithstanding what I have advanced in regard to this species, further consideration has inclined me to suspect, that it may prove ultimately only the young of the *A. Peruvianus*. In that case, however, it would appear that the absence of vomerine teeth can only be assigned as a character of this genus in the adult state.



## FAMILY.—SCIÆNIDÆ.

OTOLITHUS ANALIS. *Jen.*

This new species of *Otolithus* is from Callao: it was omitted to be noticed in the body of the work. There is but one specimen in the collection, in bad condition, and not admitting of a very detailed description; but it is evidently distinct from all the species described by Cuvier and Valenciennes.

It is rather more elongated than the *O. Guatucupa*, the depth being not much more than one-fifth of the entire length. The head is long, and contained three and a half times in the same. The lower jaw is considerably the longest. The teeth above are small, and sharp-pointed, apparently in two rows, the outer row being a little stronger than the inner: there are two very strong canines in front, springing from between the rows. Below, the teeth are in two rows in front, and one at the sides; those in front small, but those at the sides unequally sized, three or four, standing at intervals, being much stronger than the others, and very sharp. Diameter of the eye about one-sixth the length of the head; its distance from the end of the snout one diameter and a half.

The lateral line is continued to the extremity of the caudal, between the ninth and tenth rays. There is a small interval between the two dorsal fins. The second dorsal, as well as the anal, are longer than in the *O. Guatucupa*, with more soft rays, especially the anal. The pectorals are narrow and pointed, and between one-half and two-thirds the length of the head. The ventrals are attached almost exactly beneath the pectorals. The caudal appears to have been square.

D. 9—1/24; A. 1/16; P. 17; V. 1/5.

Length 12 inches.

COLOUR.—The colours were not noticed when recent, and can hardly be judged of now. The general tint appears to have been silvery. If there were any markings, no traces of them remain.

Habitat, Callao, Peru.

This species has a longer anal than any of the American species described by Cuvier and Valenciennes. I have in consequence named it *analys*.

## PRIONODES FASCIATUS. p. 47.

It has been suggested that this may be nothing more than a monstrosity. Whether this be really the fact or not, can only be determined by the examination of more specimens. But in either case, I am so satisfied now of its being a *Serranus* in all its essential characters, that I conceive it never can be placed in a different family from that genus. If the fact be established of its never possessing vomerine and palatine teeth, such a character can, at the very utmost, serve only to distinguish it as a subgenus in that group. But every day is bringing more and more to light the small value of that character.

## STEGASTES IMBRICATUS. p. 63.

I am informed by Mr. Lowe, of Madeira, that this is the same as the *Glyphisodon luridus* of Cuvier and Valenciennes.\* Their description is so short, that I failed to recognize it; and I was induced to consider it as a new genus from the circumstance of its possessing vomerine teeth. Whether these teeth exist in any other species, or have only been presumed absent in all, because not found in some, I am not aware. But here again we see how little such a character is to be depended upon.

## FAMILY.—BLENNIDÆ.

Mr. Darwin's collection contains two new forms from South America, closely allied to each other, yet forming distinct genera, and which will not enter into any of those described by authors. At first it was conceived that they were Malacopterygian fishes, more especially from their having all the rays in the dorsal and anal fins articulated; and to belong to the Apodal division of that group, from their being supposed to be without ventrals; but, on a closer inspection, the ventrals, which are very small, were found to have been overlooked, and it was evident altogether that the true place of these fishes in the system was amongst the *Blennidæ*. The mention of this circumstance will explain why they were omitted to be noticed in their proper place.

These two genera, so far as can be judged from the situations in which Mr. Darwin obtained them, have the same habits as the Blennies, lurking under stones and weeds; and I propose to give them respectively the names of *Iluocætes* and *Phucocætes*.

GENUS.—ILUOCÆTES.\* *Jen.*

*Corpus elongatum, antice subcylindricum, postice compressum, ensiforme, læve, nudum, alepidotum. Rostrum breve, obtusum, rotundatum, ultra maxillam inferiorem productum. Dentes acuti, subconici, in utraq[ue] maxillâ uniseriati: supra canini duo fortes, curvati, antici, et præ serie exstantes: in vomere dentes pauci acuti aggregati; in utroque palatino uniseriati. Lingua lævis. Oculi grandes, prominuli. Apertura branchialis mediocriter fissa, membranâ quinque-radiatâ. Maxillæ, os suborbitale, et præoperculum, tubiporis cutaneis brevibus ad margines fimbriatæ. Pinne ventrales jugulares, minutæ, gracillissimæ, triradiatæ. Pinne dorsalis et analis prælongæ, caudali coalescentes, radiis omnibus articulatis.*

If I am right in placing this new genus amongst the *Blennidæ*, it will evidently take its place next to *Zoarcæ*, to which it is more nearly allied than to any other

\* *Hist. des Poiss.* tom. 5. p. 356.

† *Ab ἰλος limus, et κοίτη cubile.*



group in that family. It agrees especially with *Zoarcæ*, not only in general form, but in having all the dorsal and anal rays articulated, (excepting one in the dorsal, which possibly may be an accident in the only specimen examined,) and in having the ventral fins extremely small. On the other hand, it departs from that genus, in having the body entirely naked, and free from scales; in the two remarkable canines in front of the upper jaw, and in having teeth on the palate; also in having no notch at the posterior part of the dorsal. It is further remarkable for its large prominent eyes, and the rows of tubipores on the cheeks. Amongst the true Malacopterygians, it approaches nearest to *Ophidium*, and, but for the circumstance of its possessing ventrals, it might perhaps be ranged under that genus. It is, however, evidently a connecting link between the *Apodal Malacopterygians* and the *Blennidæ*.

Like the Blennies, this genus has neither cæcal appendages nor air-bladder. The intestinal canal is rather ample, with a few coils, but of tolerably equal dimensions throughout.

There is but one species of this new genus in the collection, which is from the Archipelago of Chiloe. The detailed description of it is as follows:—

ILUOCÆTES FIMBRIATUS. *Jen.*

PLATE XXIX. Fig. 2.

FORM.—Very much elongated, subcylindric anteriorly, compressed and ensiform behind. Greatest depth in the region of the pectorals, and about one-tenth of the entire length. Head, measured to the extreme point of the gill-cover, five and a half times in the same. The head is rather larger than any part of the body, its depth and thickness being equal, and each a trifle less than the depth of the body. Crown and forehead a little flattened, whence the profile descends in a curve before the eyes. Snout blunt and rounded, projecting, both in front and at the sides, beyond the lower jaw. Gape wide, and reaching to beneath the middle of the eye. Intermaxillary somewhat protractile at the sides, but not in front; shorter than the maxillary, with a considerable intervention of membrane between the extremities of the two bones, which are not united posteriorly, excepting by the membrane just mentioned. Maxillary long, rather slender, of nearly uniform breadth and thickness throughout, retiring in part beneath the suborbital, and reaching backwards to a vertical from the posterior part of the orbit. Intermaxillary with a single row of small, pointed, subconical, slightly curved teeth; in front of these, and quite at the anterior extremity of the jaw, two strong, hooked, regular canines: \* the teeth in the row rather wide asunder, and set a little irregularly, about thirty in number. In the lower jaw, teeth few in number, scarcely more than eight or ten in front, rather stronger than the intermaxillary series, followed by a moderate canine on each side, these last smaller than the ones above: at the sides of the lower jaw, beyond the canines, scarcely more than one or two small teeth (possibly others are fallen). A small cluster of three or four teeth on the fore part of the vomer, like those in front of the lower jaw, and a

\* One of these is gone in this specimen, but the socket in which it was implanted is obvious.

row on each palatine. Pharynx also armed with strong teeth; but the tongue, which is free at the tip, and rounded, smooth. Eyes large and prominent, and elevated rather above the line of the profile: their diameter one-fourth the length of the head; their distance from the end of the snout one diameter; the interocular space reduced to a narrow channel, and scarcely equalling half a diameter.

Opercle of a triangular form; subopercle lanceolate, projecting further than the opercle, and passing upwards and backwards to form the terminating angle of the gill-cover. Gill-opening of very moderate extent; the branchial membrane fastened down underneath, with five rays. Skin smooth and naked, loose, and probably very mucous in the living fish. Apparently no lateral line. The edges of both jaws curiously fringed each with a row of tubipores, or cutaneous appendages in the form of tubes, having pores at their terminal extremities for the exudation of mucus. The row on the upper jaw is continued along the margin of the suborbital on to the cheek; that on the lower is carried upwards to form an edging to the preopercle. There is also one of these tubipores at each nostril, another behind each eye, and a third on each side of the nape.

The dorsal commences above the terminating angle of the gill-cover, and extends the whole length of the body: its height nearly uniform throughout, equalling half the depth: the rays slender; all articulated, except the third, which is spinous, and shorter than those which precede and follow it; mostly simple, but some of the posterior ones slightly divided at their tips. Vent situate beneath the termination of the first quarter of the dorsal. The anal begins immediately behind it, and, like the dorsal, is carried on to the end of the body, to unite with it in forming a pointed caudal; all the rays soft and delicate. Pectorals rather pointed, with the middle rays longest, and about two-thirds the length of the head. Ventrals very minute and narrow, of only three rays, and appearing like one filament, about one-third the length of the pectorals; attached in front of the pectorals, and nearly in a line with the gill-opening.

B. 5; D. about 80; A. about 60; C. about 15; P. 16; V. 3.

Length 5 inc. 9 lin.

COLOUR.—Not noticed in the recent state. In spirits it is nearly colourless, with the exception of a dark bluish line along the base of the dorsal; upper part of the head, and nape, also stained with the same dark tint.

Habitat, Archipelago of Chiloe.

This species was taken by Mr. Darwin under stones. There is but one specimen in the collection, and it would be very desirable to see others, in order to ascertain whether the circumstance of the *third* dorsal ray *alone* being spinous, (those that precede as well as follow being articulated), is merely accidental in the one above described, or really characteristic of the species. If the latter, it is an anomaly,—a single spine thus occurring in the middle of a soft fin,—of which I know no other example.



## GENUS.—PHUCOCETES.\* Jen.

*Corpus elongatum, compressum, nudum, alepidotum, porosissimum. Rostrum breve, obtusum. Dentes acuti, subconici, in maxillâ superiore uniseriati, in inferiore bi-vel tri-seriati; supra canini duo fortiores, antichi, et præ serie exstantes: in vomere dentes duo vel tres acuti, quorum unus fortis; in utroque palatino uniseriati. Lingua lævis. Oculi parvi. Apertura branchialis arctissima, membranâ sex-radiatâ. Maxillarum margines poris conspicuis longitudinaliter dispositis, simplicibus, haud in tubos productis. Pinnæ ventrales, dorsalis et analis, ut in genere præcedenti.*

This genus differs from *Iluocetes*, in having the head and eyes smaller, the snout scarcely at all produced, the teeth in front of the lower jaw in two or three rows, and especially in the contracted gill-opening, which is reduced to a small hole, relatively not much larger than in the Eels, and in the branchial membrane having six rays. It wants also the tubal cutaneous appendages on the jaws and cheeks, in the place of which are rows of simple pores. It may be added that the whole skin is every where studded with pores; smaller, however, than those which form the maxillary series. The fins are similar, including the minute ventrals; but the tail and caudal are more rounded, and the membrane investing the rays of the dorsal and anal is more fleshy, so as hardly to allow of the rays being counted.

This genus is yet more eel-like, and more malacopterygian in general appearance than the last, serving to make the passage from the *Blennidæ* to the apodal division of the soft-finned fishes, still more gradual and evident. Mr. Darwin obtained it at the Falkland Islands. There is but one species in the collection referable to it.

## PHUCOCETES LATITANS. Jen.

PLATE XXIX. Fig. 3.

FORM.—Still more elongated than the *Iluocetes fimbriatus*, but not tapering so much to a point posteriorly, the tail being blunter and more rounded. Greatest depth about one-eleventh of the entire length: head one-seventh. Head more compressed, its thickness being only three-fourths of its depth. Nape rather more elevated, and the profile more sloping, its descent commencing at a more backward point. Snout equally short and rounded, but much less projecting over the lower jaw. Gape, intermaxillary, and maxillary, similar: also the teeth; only the pair of canines above, standing in front of the series, are smaller; and below, the teeth in front are in two or more rows. On the fore part of the vomer is one strong tooth, and apparently one or two other smaller teeth with it; on each palatine a row, one or two of the anterior ones being stronger than the others. Eyes very much smaller; their diameter scarcely more than one-seventh the length of the head; not sufficiently high in the cheeks to cut the line of the profile: interocular space slightly convex.

\* Α φυκος fucus, et κοίτη cubile.

Pieces of the gill-cover on the whole similar, but the branchial aperture much smaller, the fissure not descending below the level of the upper part of the pectoral: branchial membrane with six rays. Skin quite naked, and thickly studded all over with mucous pores. Also some very large and conspicuous pores in rows on the jaws and cheeks, but not elevated into cutaneous tubes, excepting the nostrils, which are tubular.

Dorsal and anal with all the rays articulated, and the greater part of them simple, but some toward the tail a little branched at their tips. Caudal not so pointed as in *Iluocetes*. Pectorals and ventrals similar, but the latter a trifle longer and broader in proportion.

Length 4 inc. 7 lines.

COLOUR.—(*In spirits*.)—Brown, with the jaws, under part of the head, and lower half of the cheeks, whitish; also a whitish fascia extending longitudinally from behind each eye to the upper angle of the opercle.

A second specimen in the collection is smaller than the above, measuring only two inches and a half in length. It is in bad condition, but does not appear to differ, except in having the anterior canines above but very little developed.

Habitat, Falkland Islands.

Both individuals of this species were taken by Mr. Darwin in the Falkland Islands. "Caught amongst kelp."—D.



# ERRATA.

Page 6, line 2, from the bottom, for *versus apicem* read *apicem versus*.  
9, — 7, ————— for *versum angulum* read *angulum versus*.  
13, — 4, ————— for *ciliatis* read *ciliatæ*  
18, — 17, from the top, for *duobus* read *duabus*.

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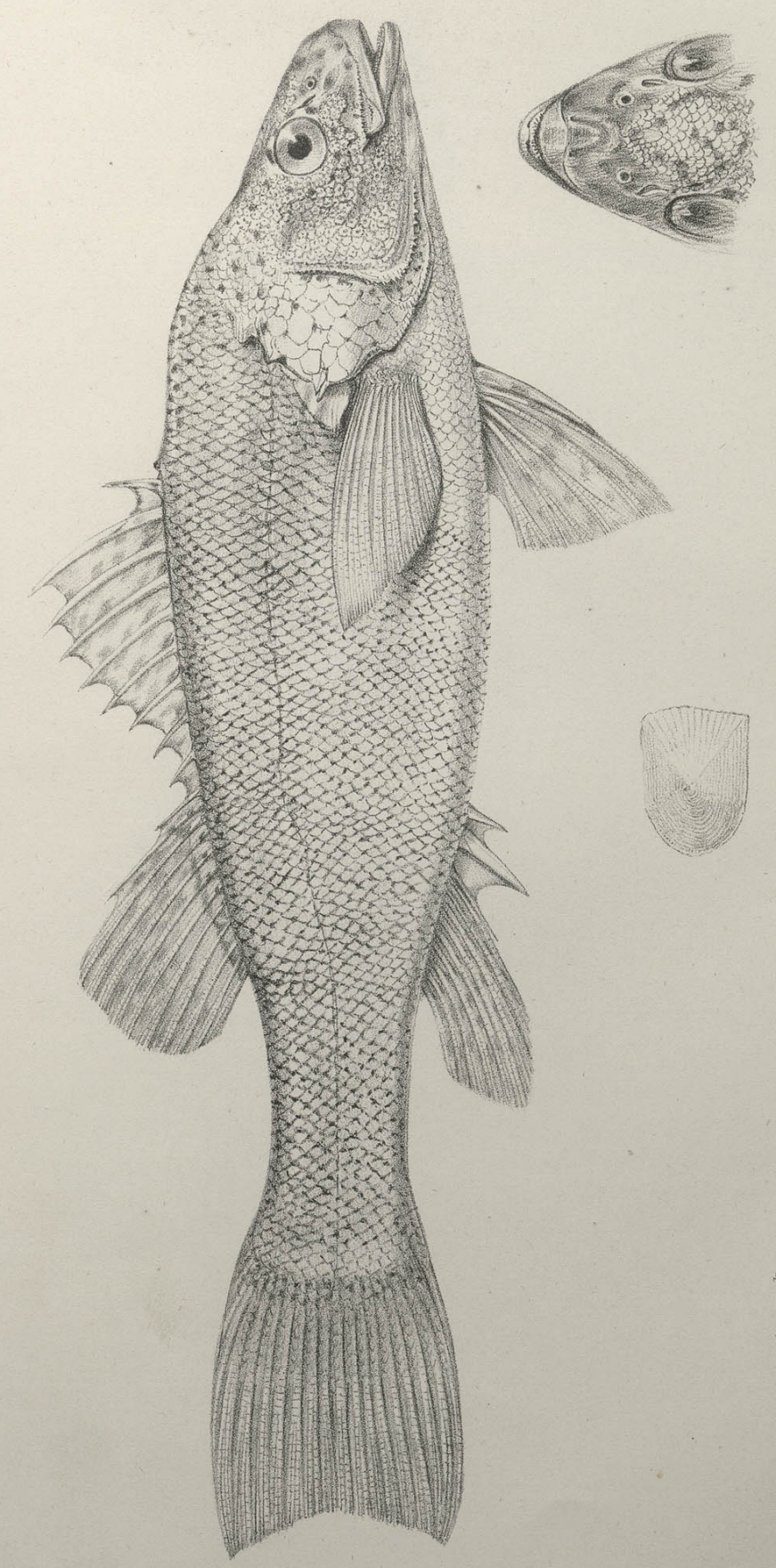


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Fish Pl. I.

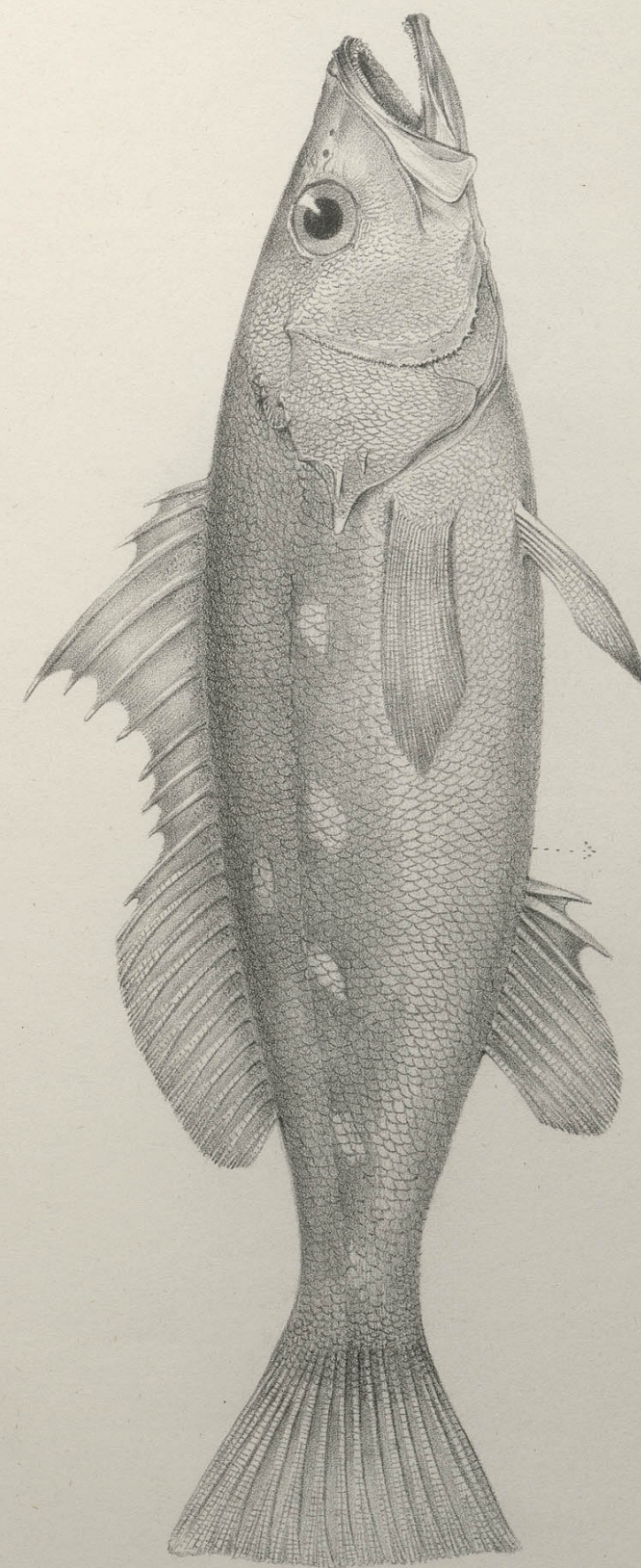


*Perna laevis*, 4 Mac. 610.

W. H. Edwards del.



Fish Pl. 2.

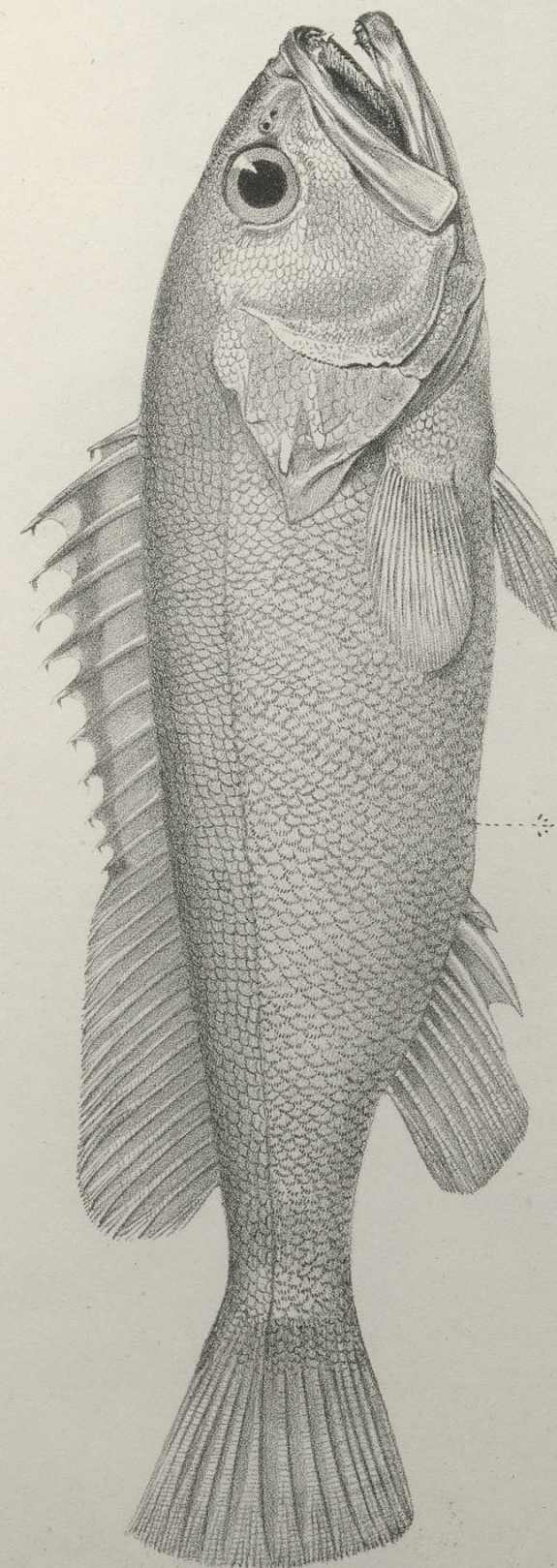


*Serranus albonaculatus*, Macr. & Sze.

Drawn from Nature on wood by Macleod & Macleod.



Fish Pl. 3.

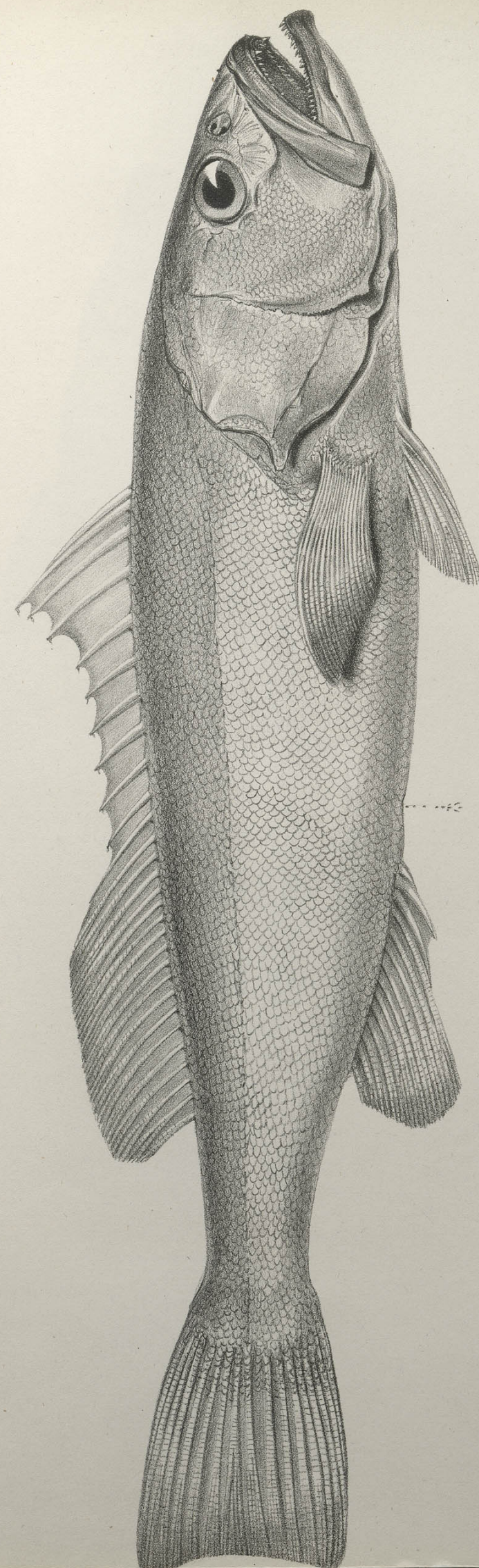


*Serranus labryformis.*  $\frac{1}{2}$  Nat. Size.

Drawing from Nature on Stone by Mr. Richard Dainton.



Fish Pl. 4.

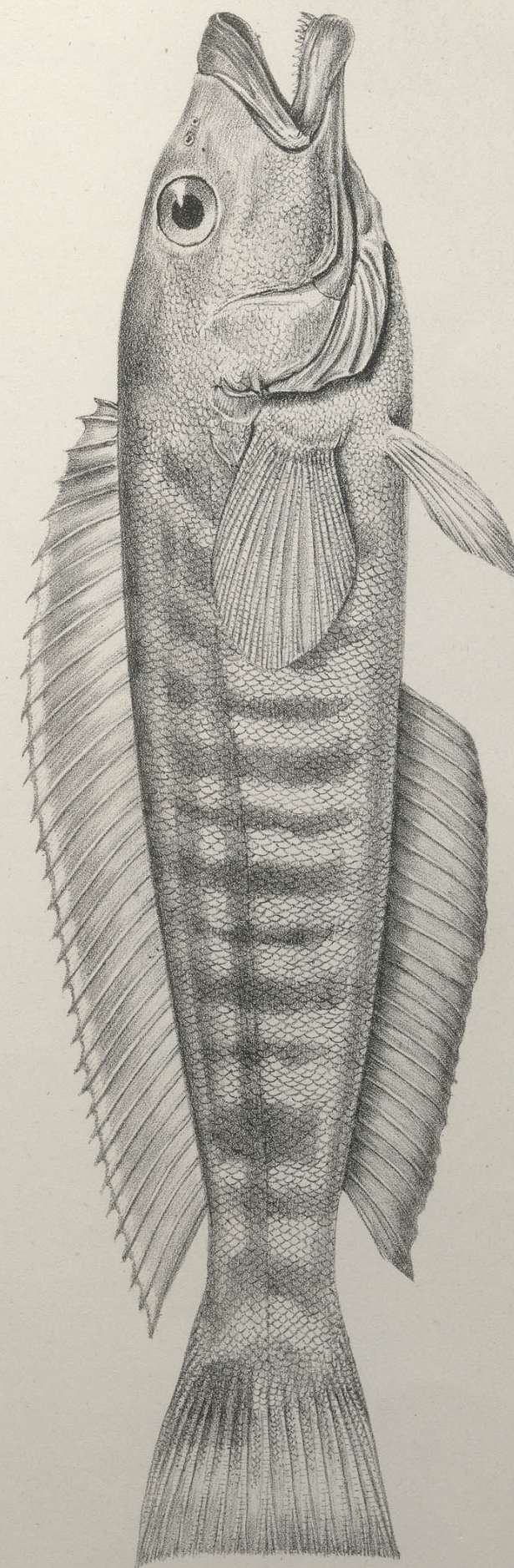


*Serranus ciliatus*. 7/8 Nov. 5100

W. H. Edwards del.



Fish Pl 5.

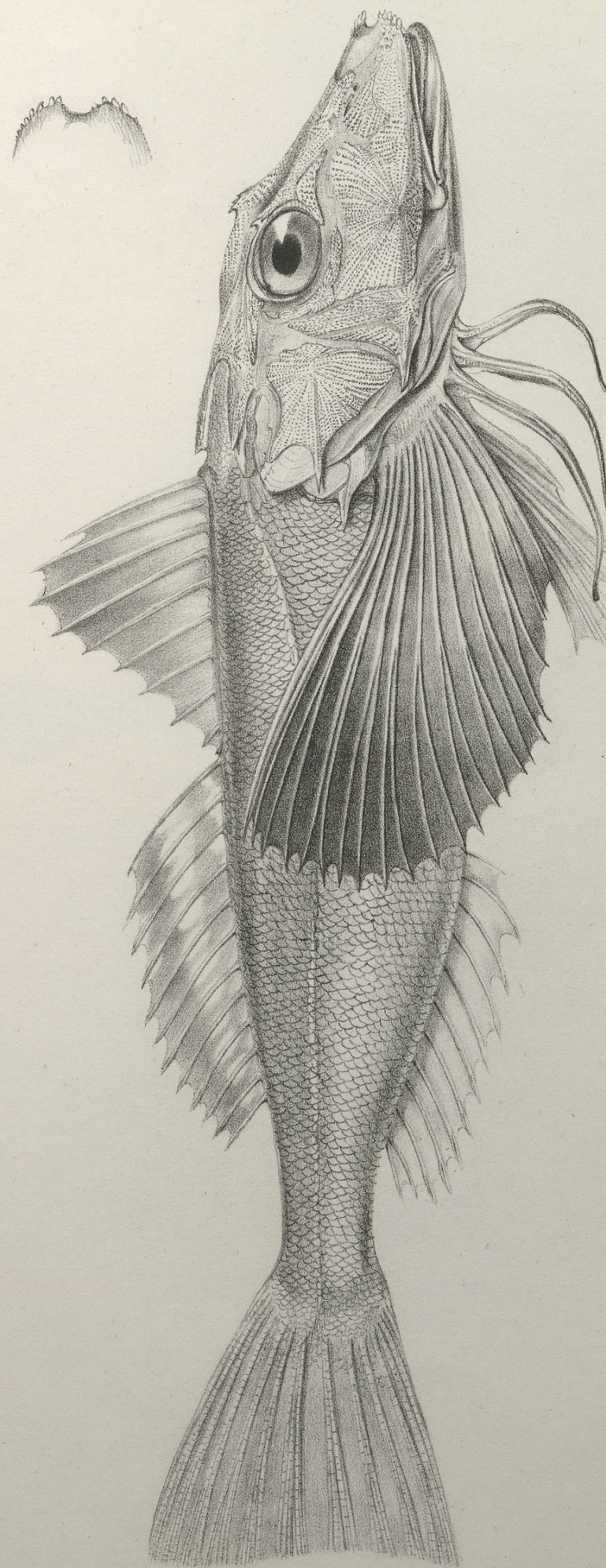


*Pingupe fuscatus*.  $\frac{1}{4}$  Nat. size.

T. Zuercher del.



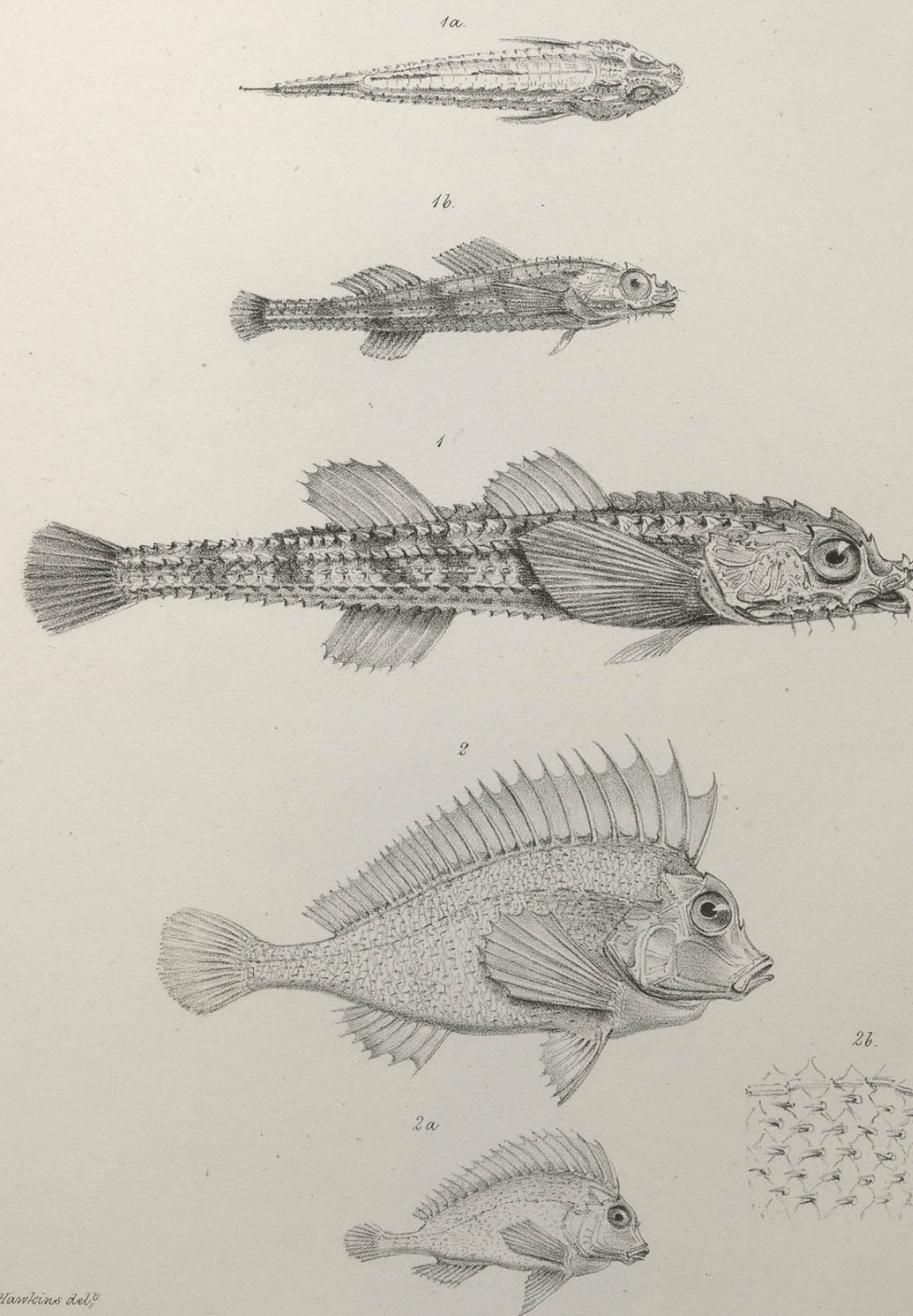
Fish. Pl. 6.



*Prionotus Miles Macdon.*

*W. Hancock del.*



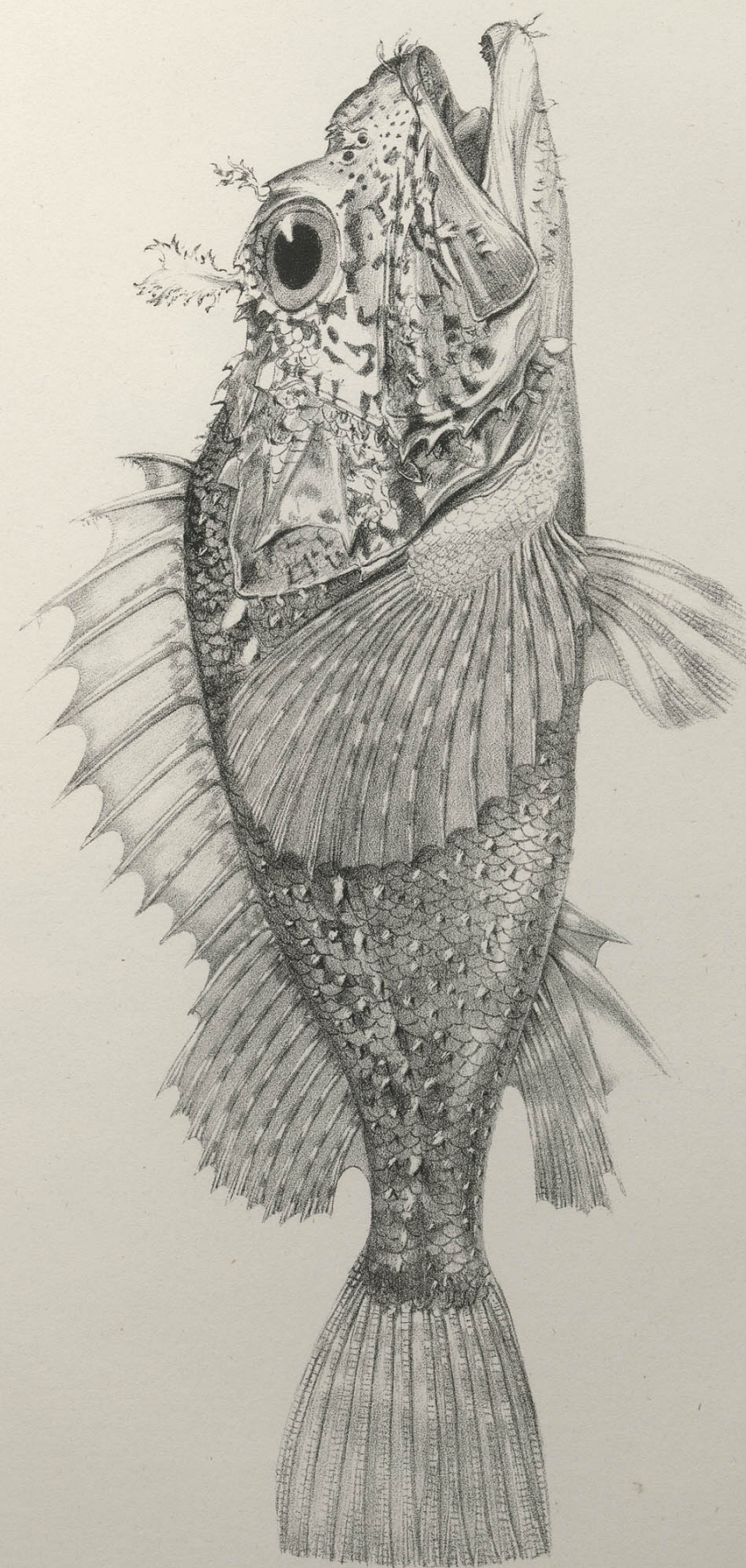


W. Hawkins del.

- |                                     |                   |
|-------------------------------------|-------------------|
| 1. <i>Aspidophorus Chiloensis</i> . | Twice Nat. size.  |
| 1a. 1b.                             | Nat. size.        |
| 2. <i>Agriopus hispidus</i> .       | Twice Nat. size.  |
| 2a.                                 | Nat. size.        |
| 2b.                                 | Magnified Scales. |

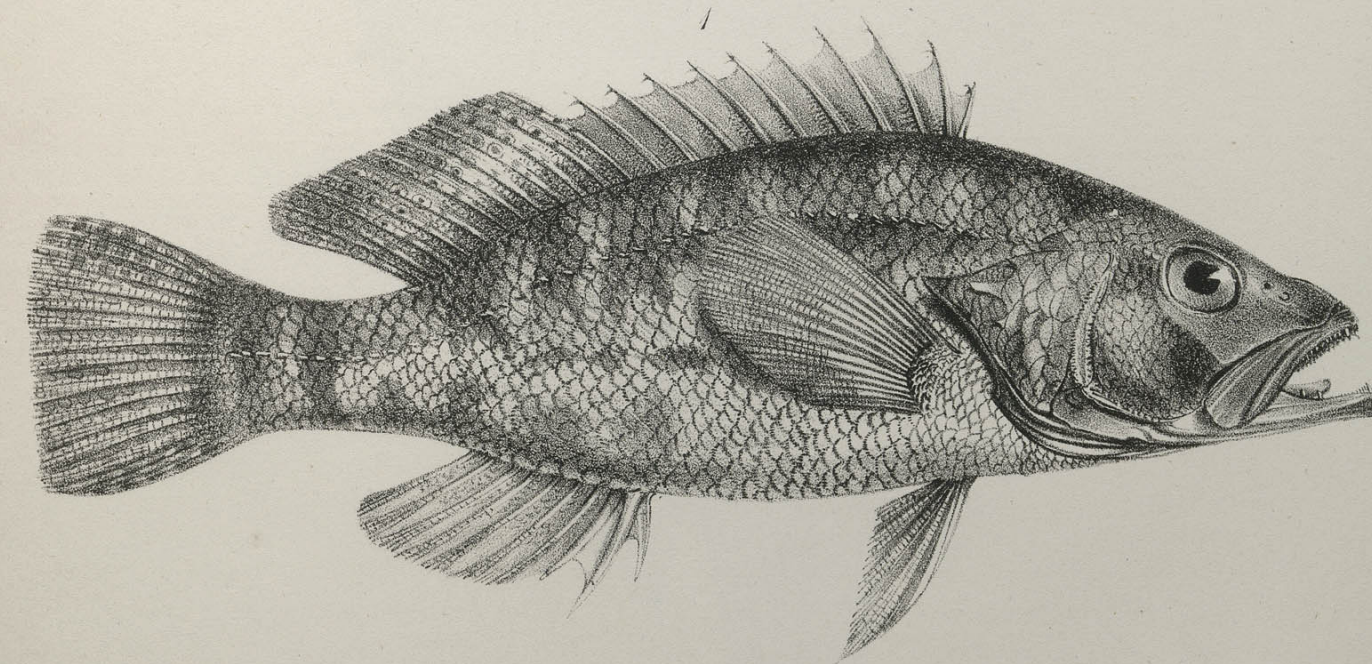
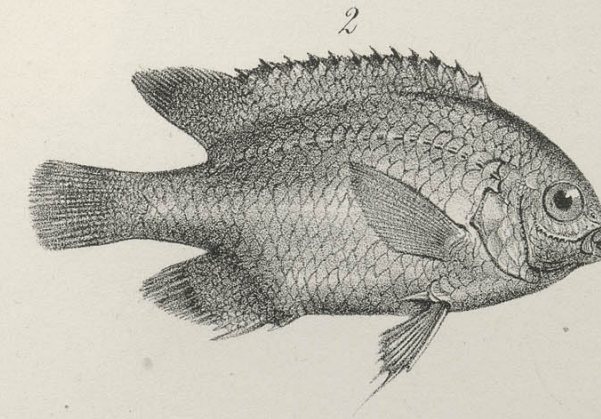


Fish Pl 8.



*Scorpana Hetero. Macrura*



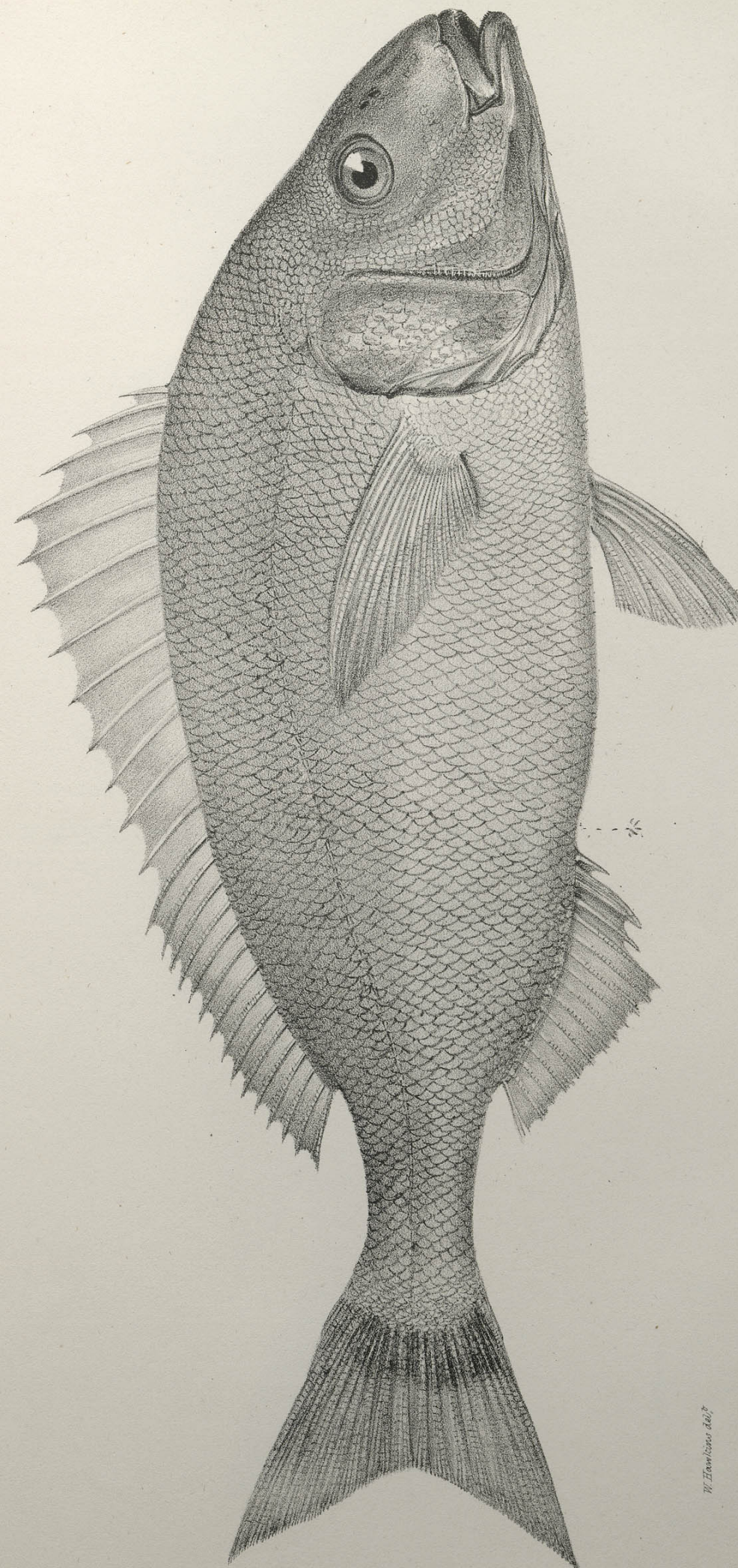


W. Hamilton del.

Fig. 1. *Prionodes fasciatus*.  
2. *Stegastes imbricatus* } Nat. Size.



Fish. Pl. 10.

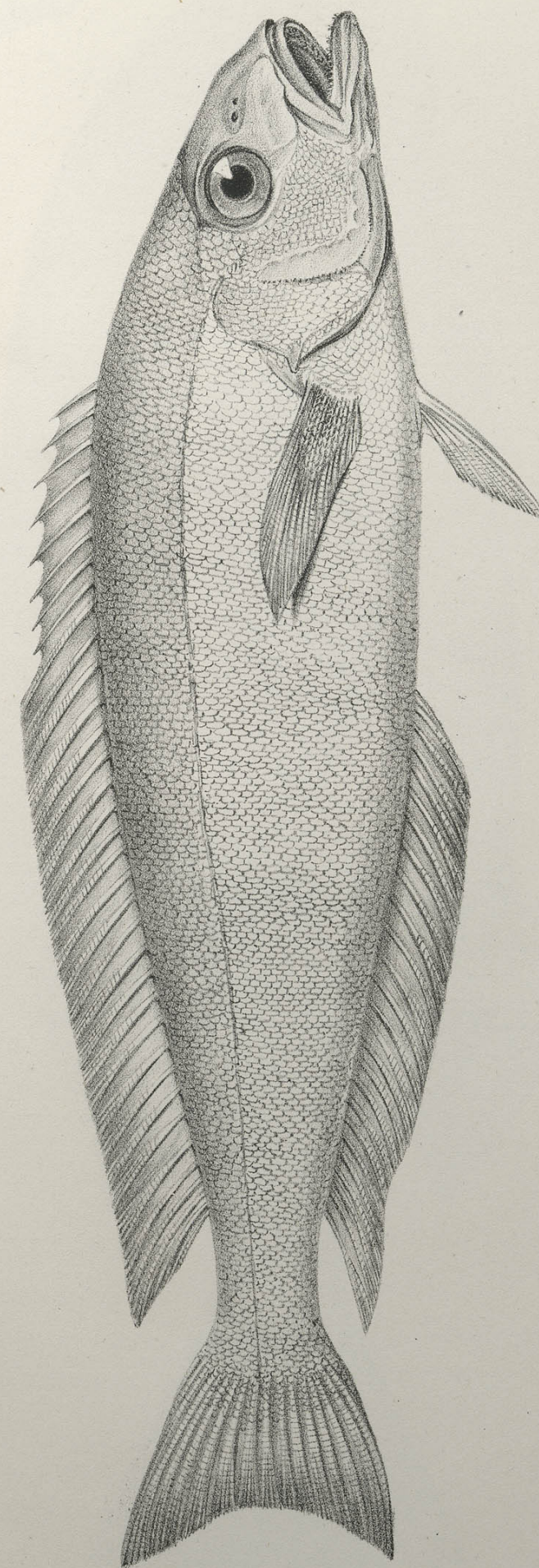


*Prestipoma caucharium* Naes-Sae

W. Edwards del.



Fish. Pl. M.

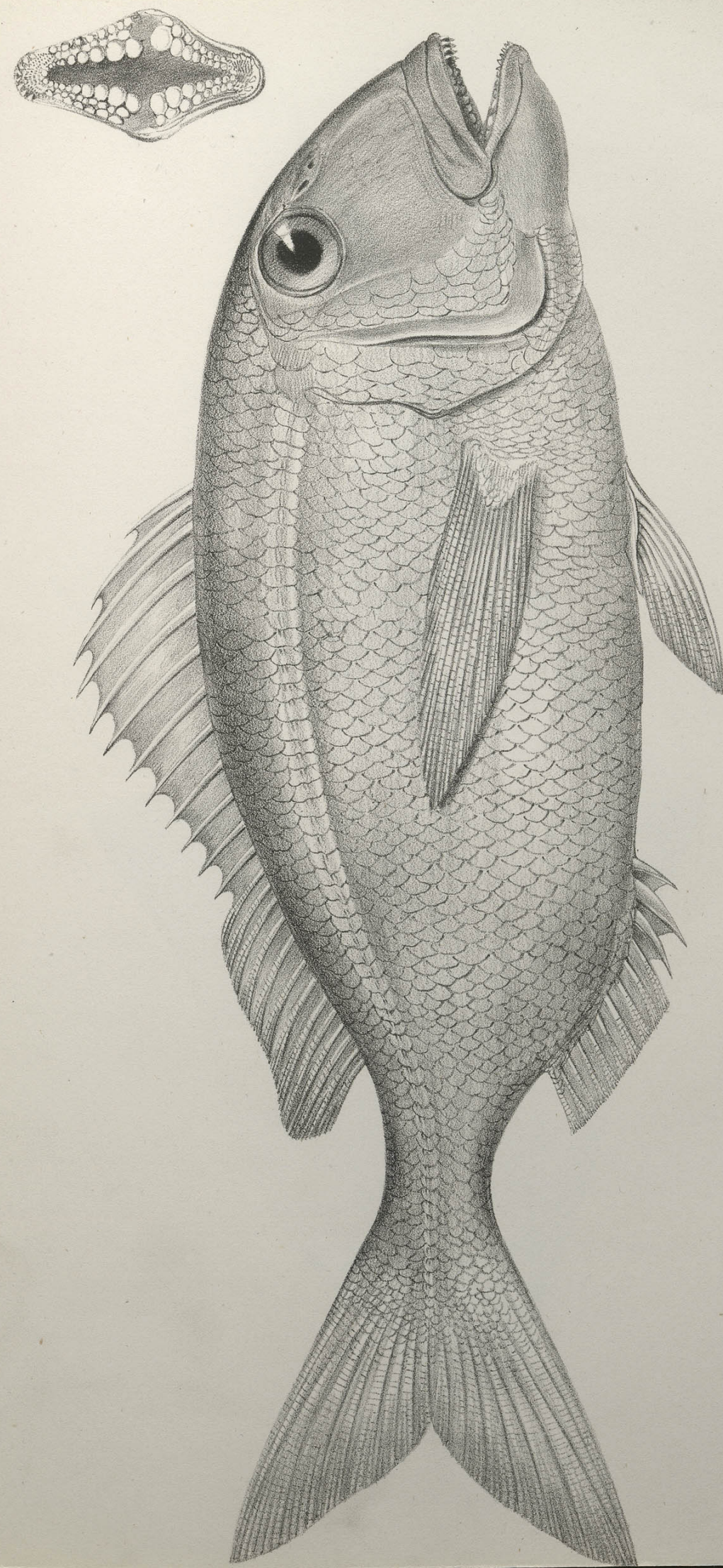


*Latilus princeps*,  $\beta$ . var. size.

W. Hamilton del.



Fish. Pl. 12.

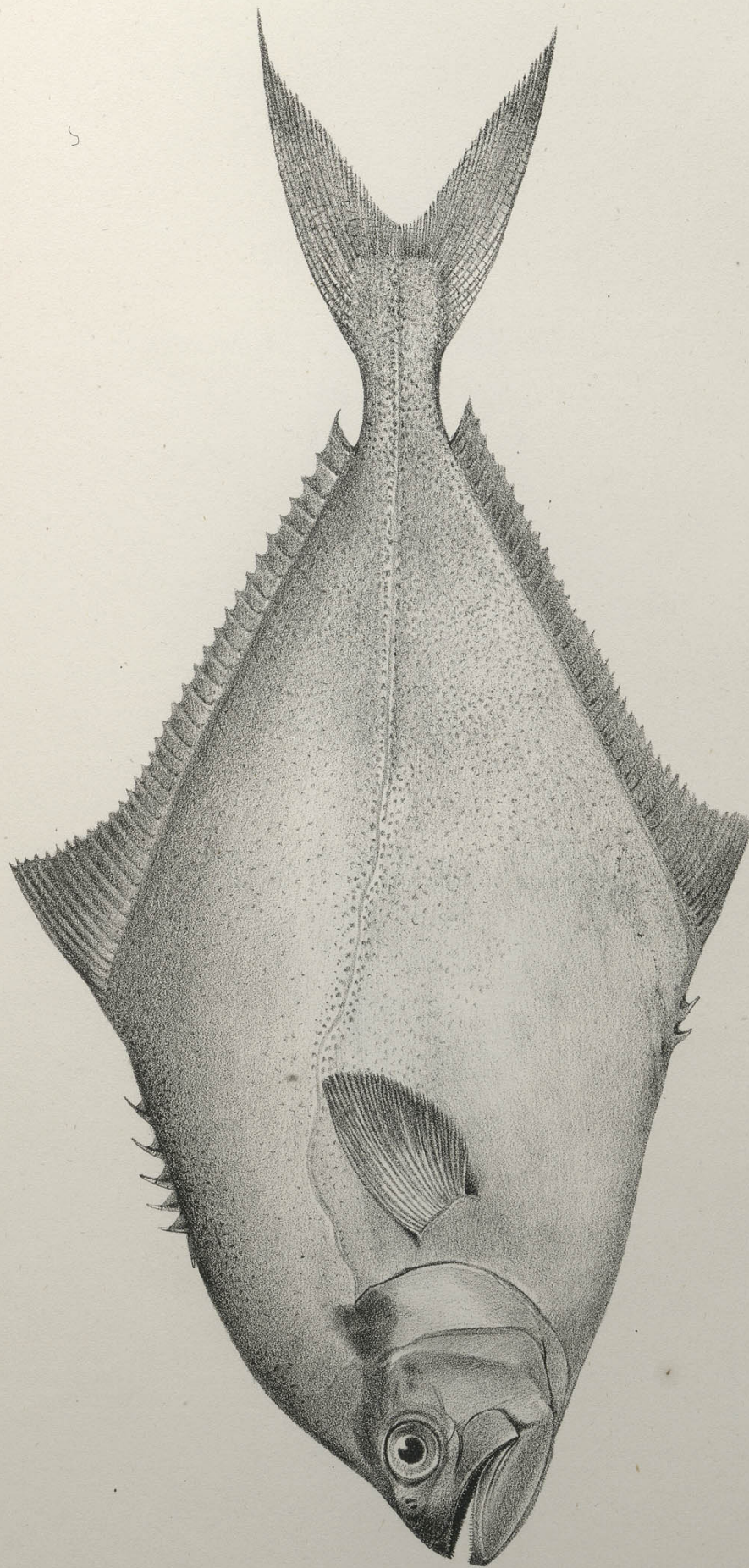


*Chrysophrys taurina* 3/4 Nat. Size

N. Horsman del.



Fish Pl 13.

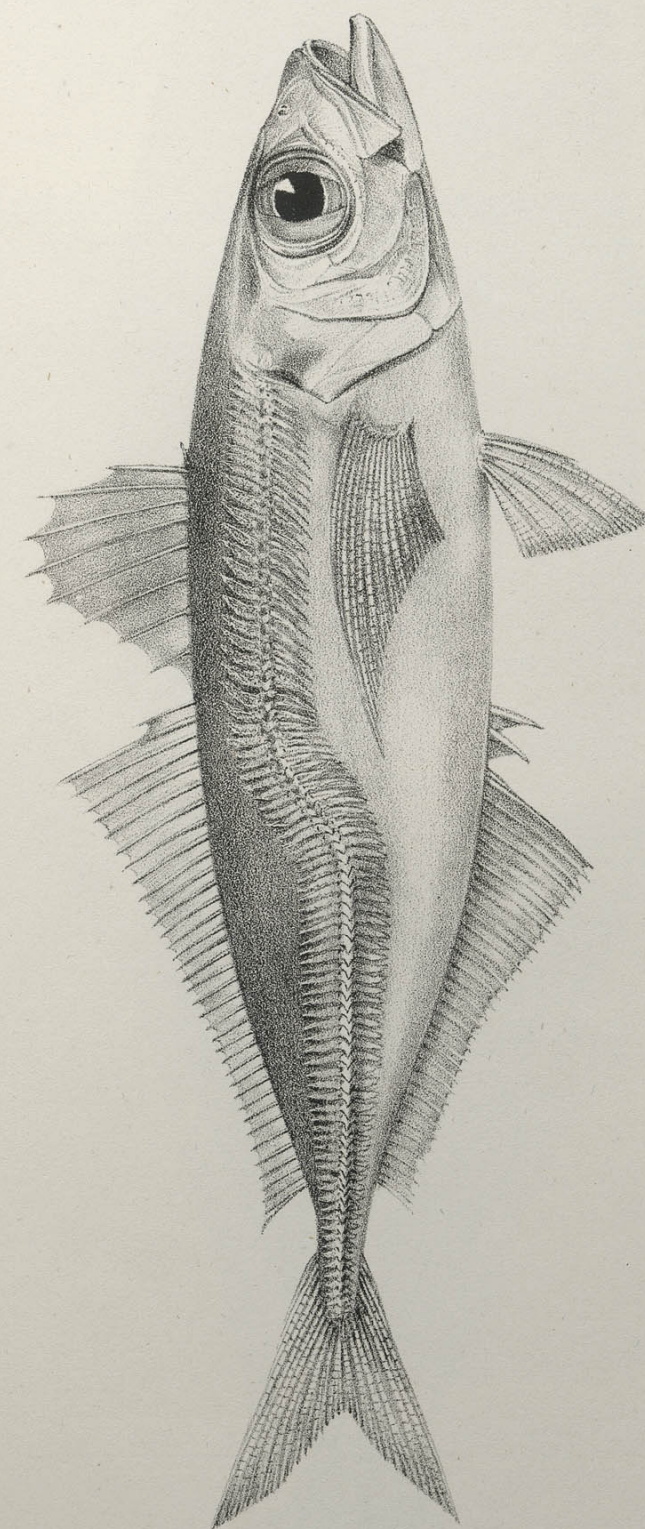


*Laropsis signata*. Nat size.

W. Hancock del.



Fish Pl. 14

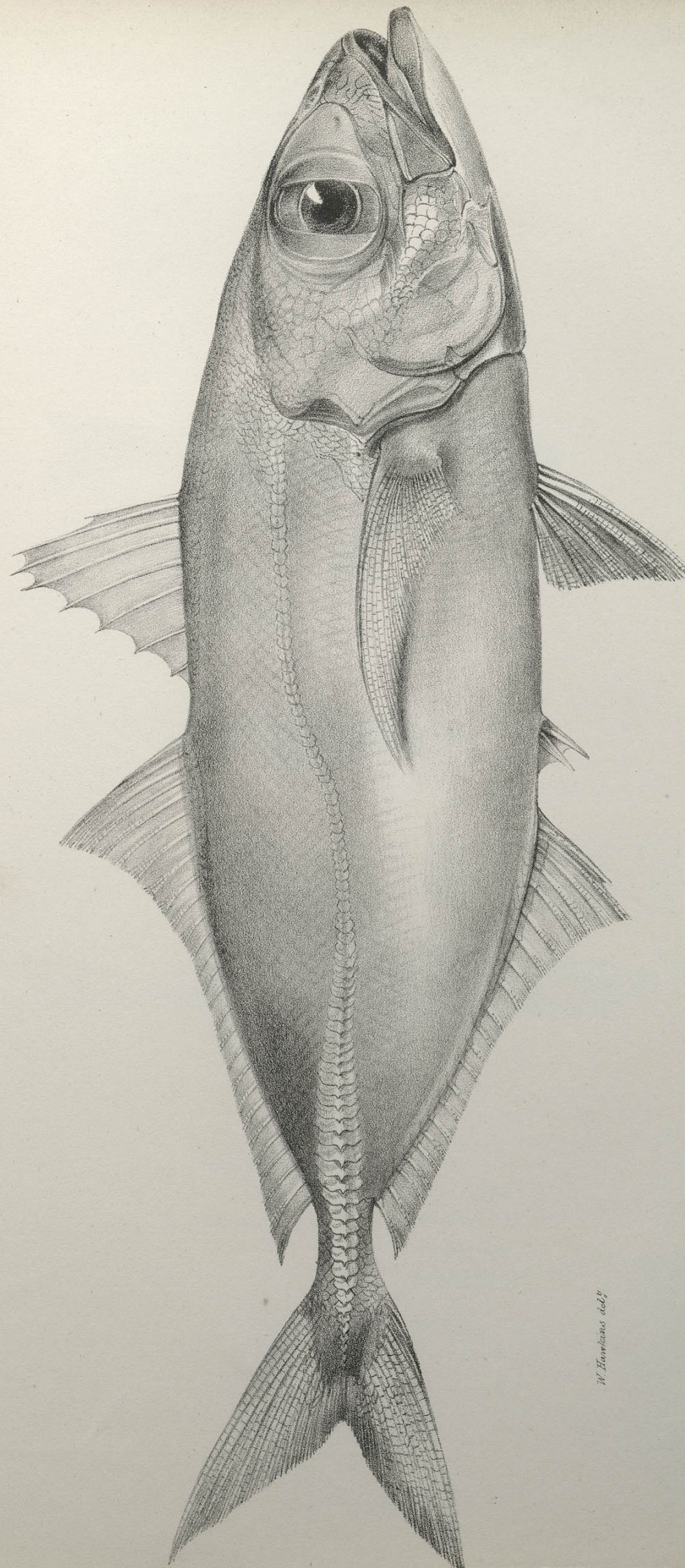


*Canavus declivis* Mac. GILL

W. H. Edwards del.



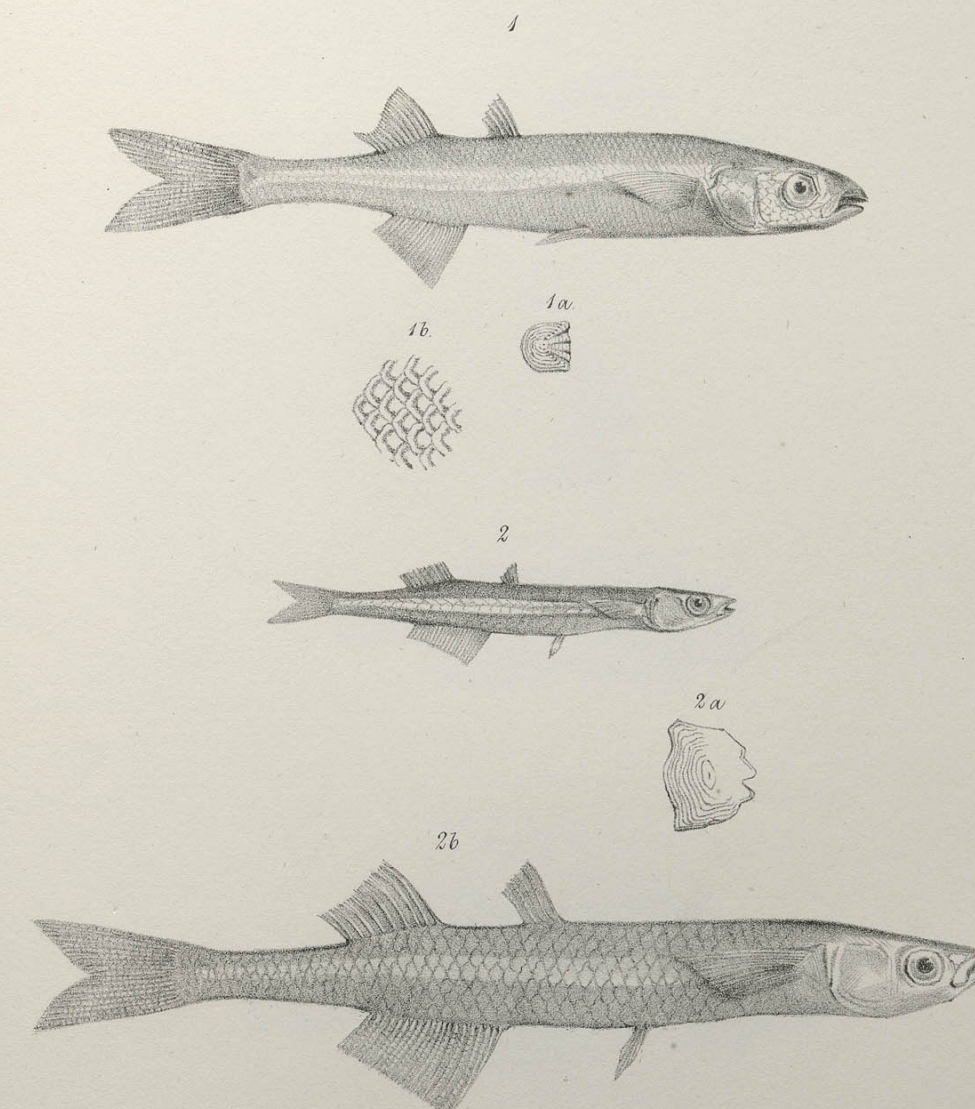
Fish Pl. 15



*Cassius cornutus* *Nat. Hist.*

*W. Edwards del.*



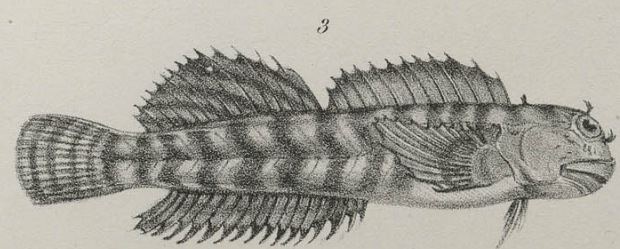
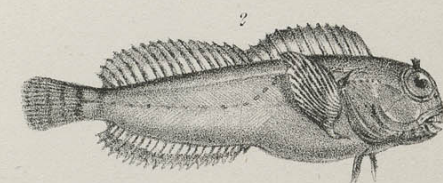
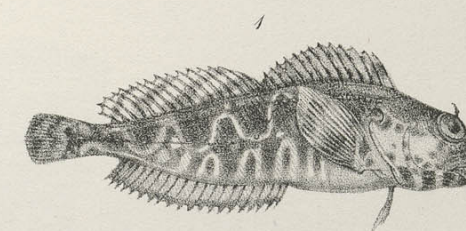


Drawn from Nature on Stone by Waterhouse-Townsend.

- |         |                                |                   |
|---------|--------------------------------|-------------------|
| 1       | <i>Atherina Microlepidota.</i> | Nat. Size         |
| 1a. 1b. | " "                            | magnified Scales. |
| 2       | <i>Atherina incisa.</i>        | Nat. Size.        |
| 2a.     | " "                            | magnified Scale.  |
| 2b.     | " "                            | Twice Nat. Size.  |



Fish Pl. VII.

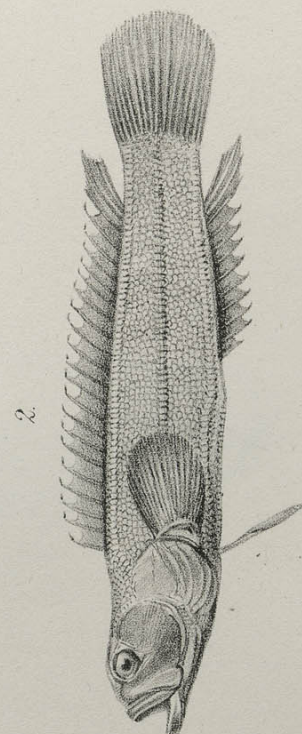
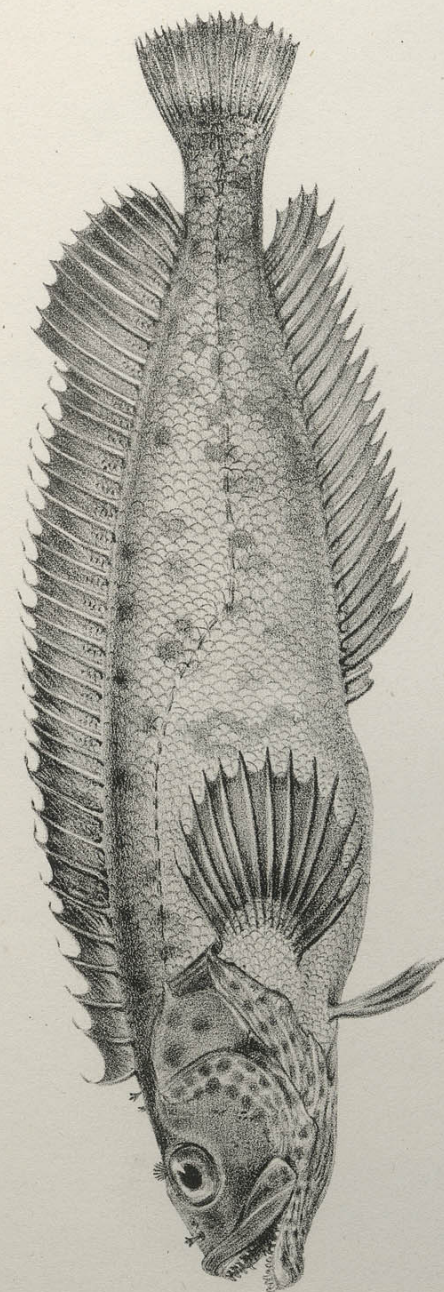


Waterhouse Hancock del.

1. *Blennechis fasciatus*. Nat. Size.
- 1a. " " Teeth magnified.
2. *Blennechis ornatus*. Nat. Size.
3. *Salaria Vomerinus*. Nat. Size.



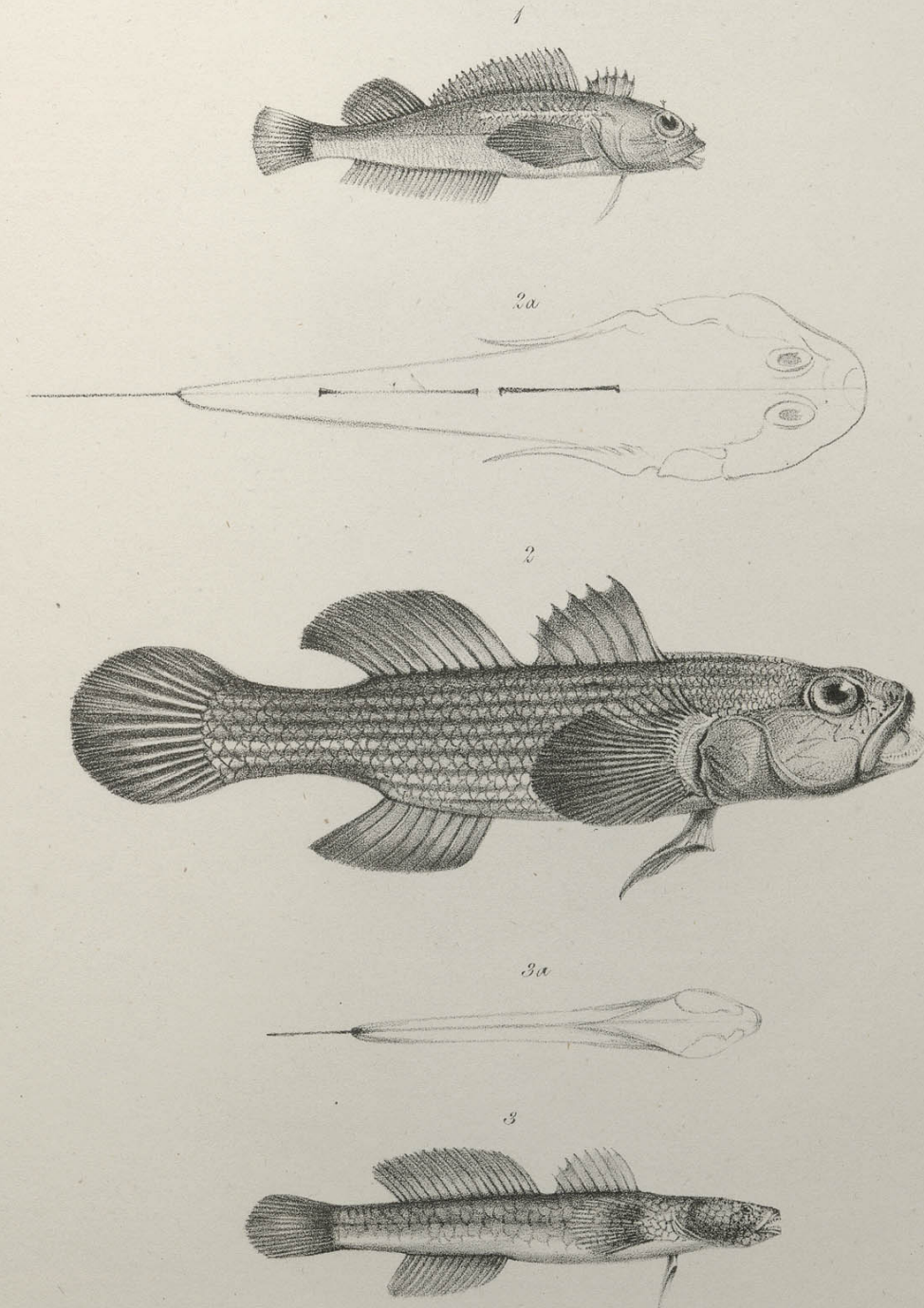
Fish. Pl. 18.



Wardhouse Tarsus del.

1. *Clinus crinitus* Macleay.  
2. *Acanthodinus fuscus* Macleay.



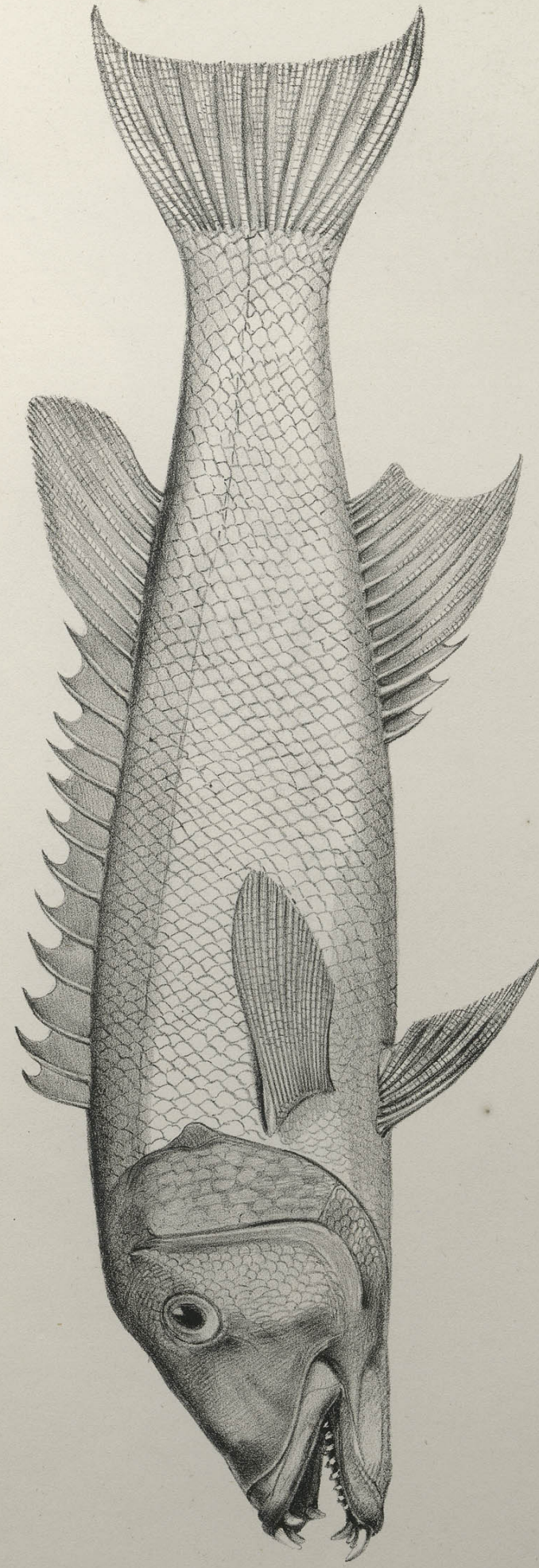


W. A. Cresswell del.

- 1. *Tripterygion Capito.*
- 2. *Gobius lineatus.*
- 2a. " " dorsal View.
- 3. *Gobius ophicephalus.*
- 3a. " " dorsal View.



Fish. Pl. 20

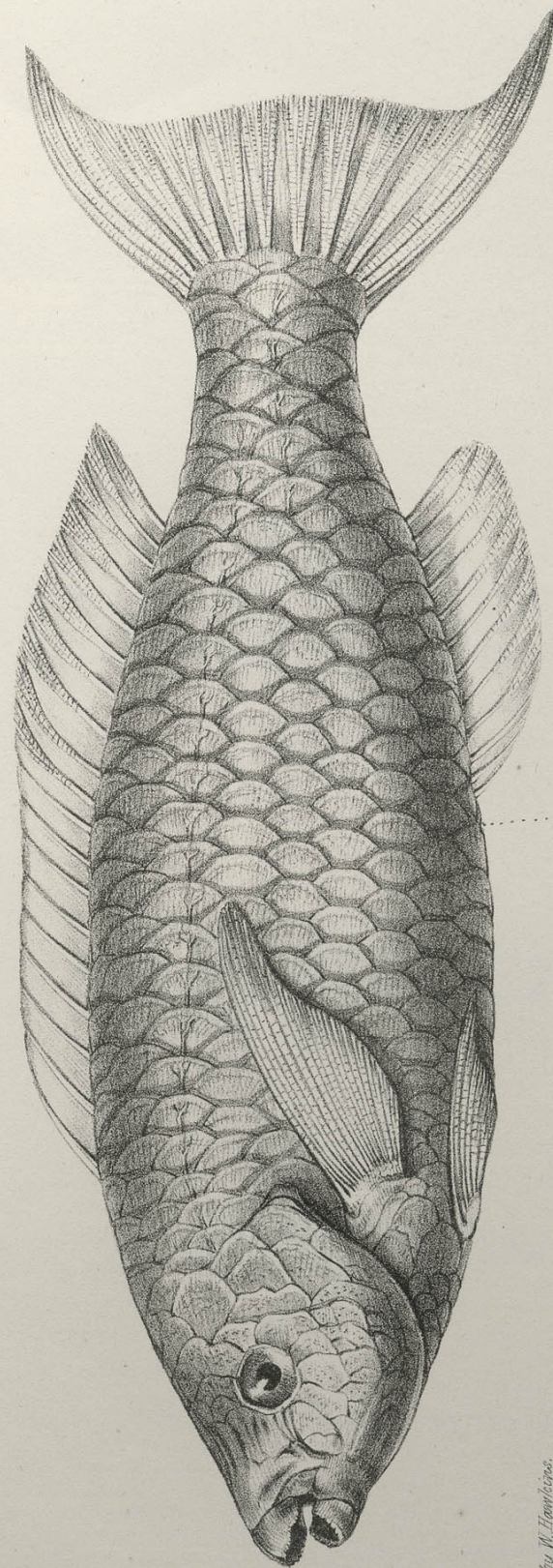


*Cosyphus Darwini* 7/8 Nat. size.

W. Hancock del.



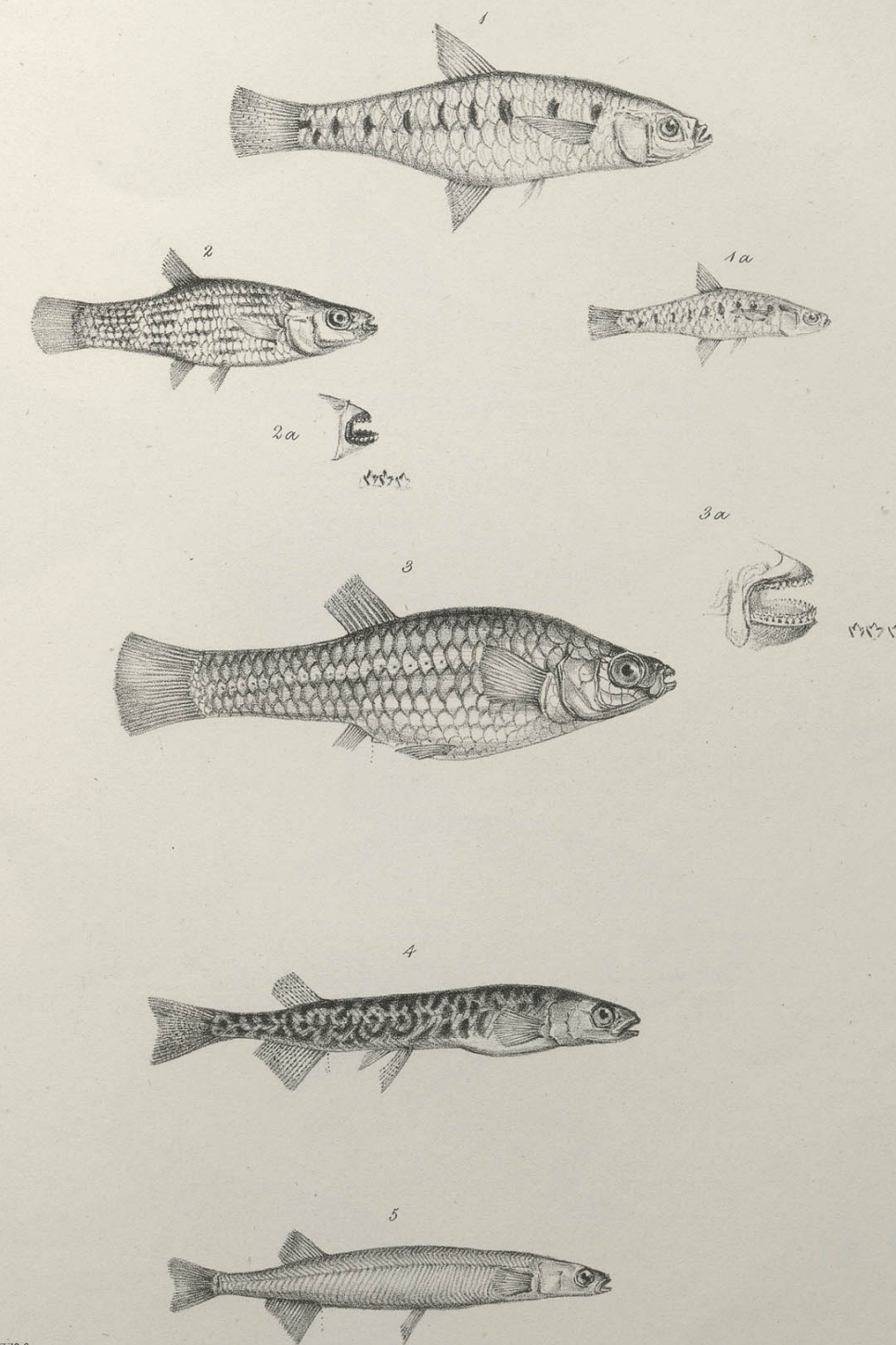
Fish. Pl. 24



*Surge Thalassoma muricatum*

Engraving from Nature by H. Hancock





From Nature on Stone by W. Hambleton.

N<sup>o</sup> 1. *Pecilia decem-maculata*. Magnified View twice Natural Size.

1a. .... Natural Size.

2. *Lebias lineata* ..... Nat. Size.

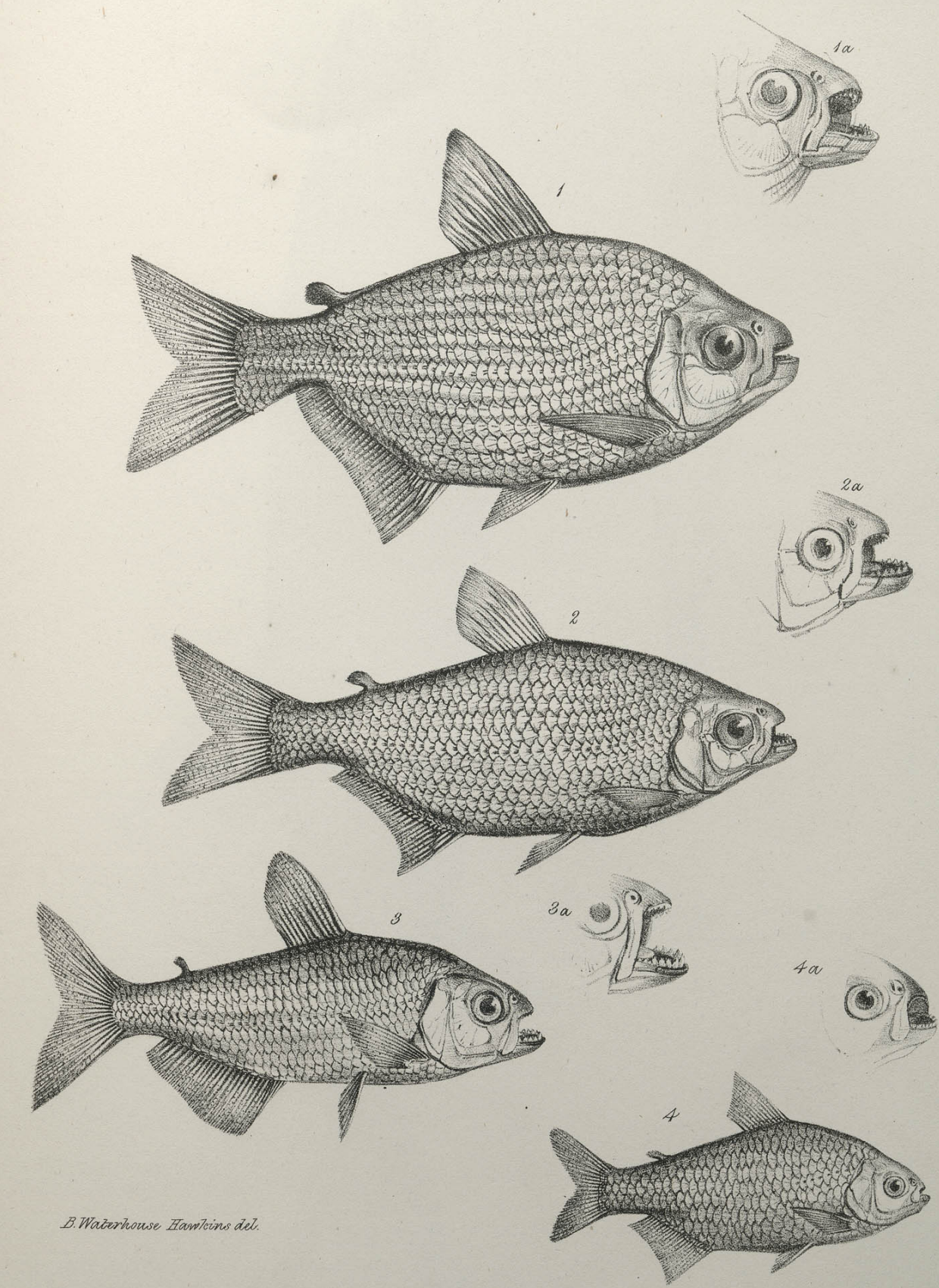
2a. .... Magnified View of Teeth

3. *Lebias multidentata* ..... Nat. Size.

3a. .... Magnified View of Teeth

4. *Mesites maculatus* }  
5. .... *attenuatus* } Nat. Size.



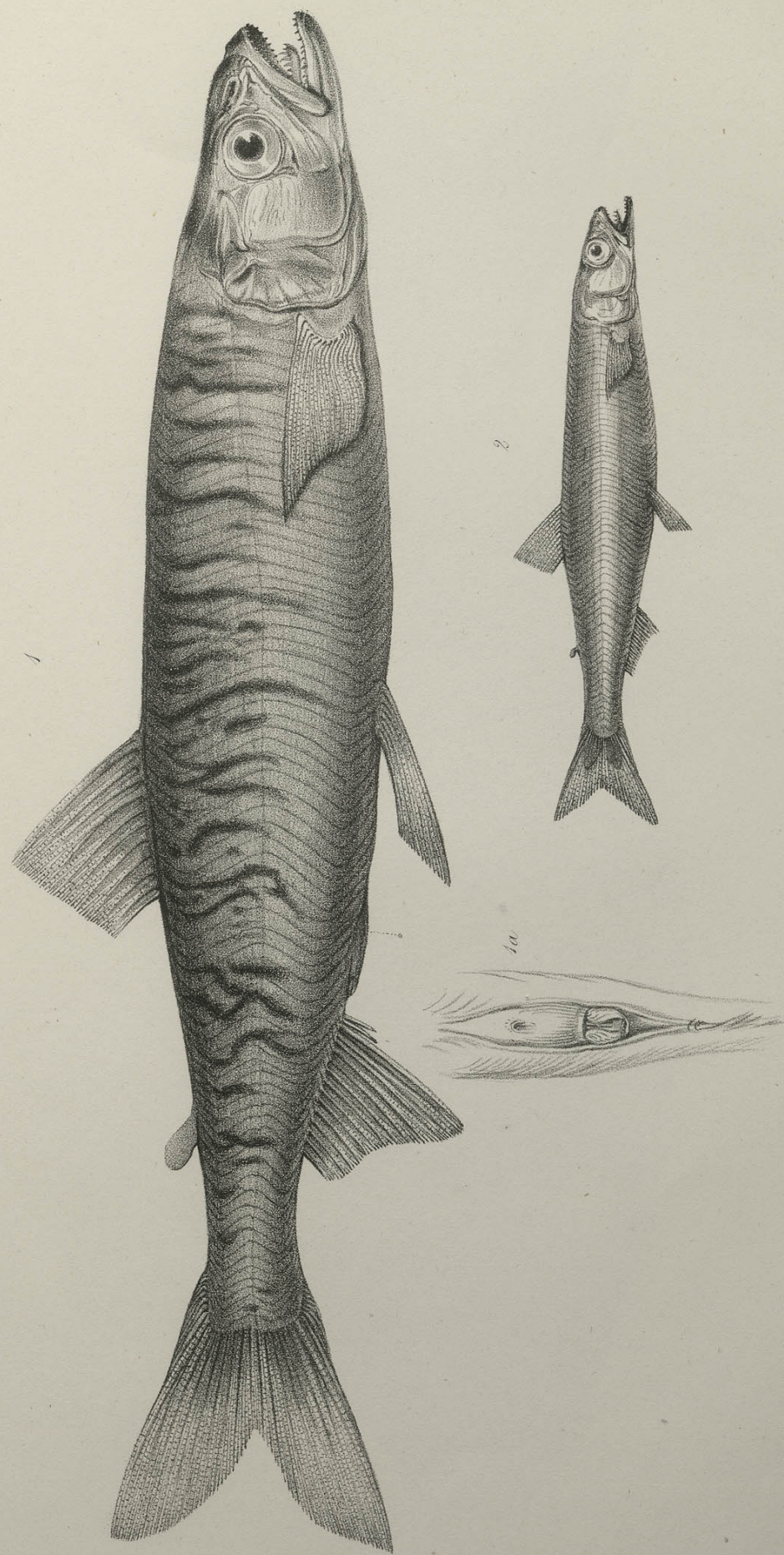


*E. Waterhouse. H. J. de Meijere del.*

- |       |                           |                  |
|-------|---------------------------|------------------|
| Nº 1. | <i>Tetraodon lineatus</i> | } All Nat. Size. |
| 2.    | <i>nitidus</i>            |                  |
| 3.    | <i>scabripinnis</i>       |                  |
| 4.    | <i>interruptus</i>        |                  |
- 1a. 2a. 3a. 4a. Magnified View of Teeth.



Fish. Pl. 24.

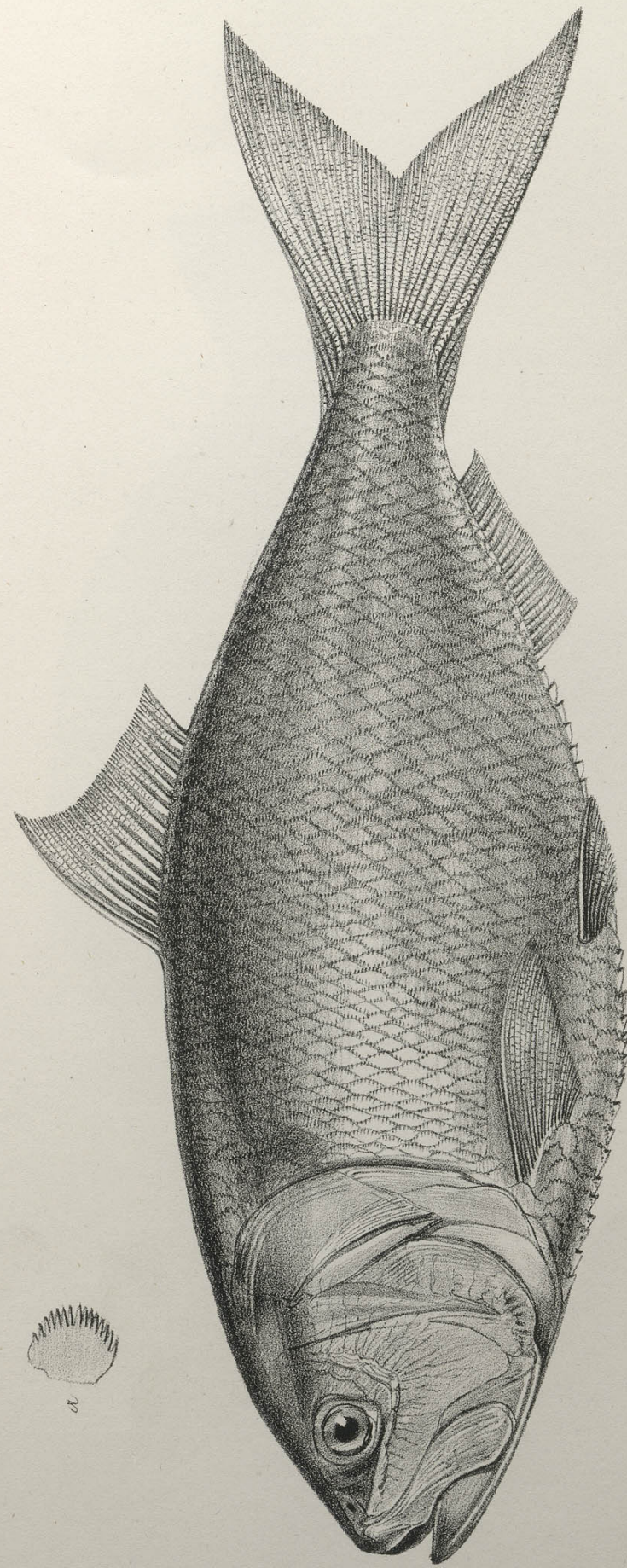


1. *Aplodinotus zebroides*. Nat. Size.  
1a. Magnified Throat and generative openings.  
2. *Aplodinotus tanicatus*. Nat. Size.

Macmillan & Co. del.



Fish. Pl. 25.

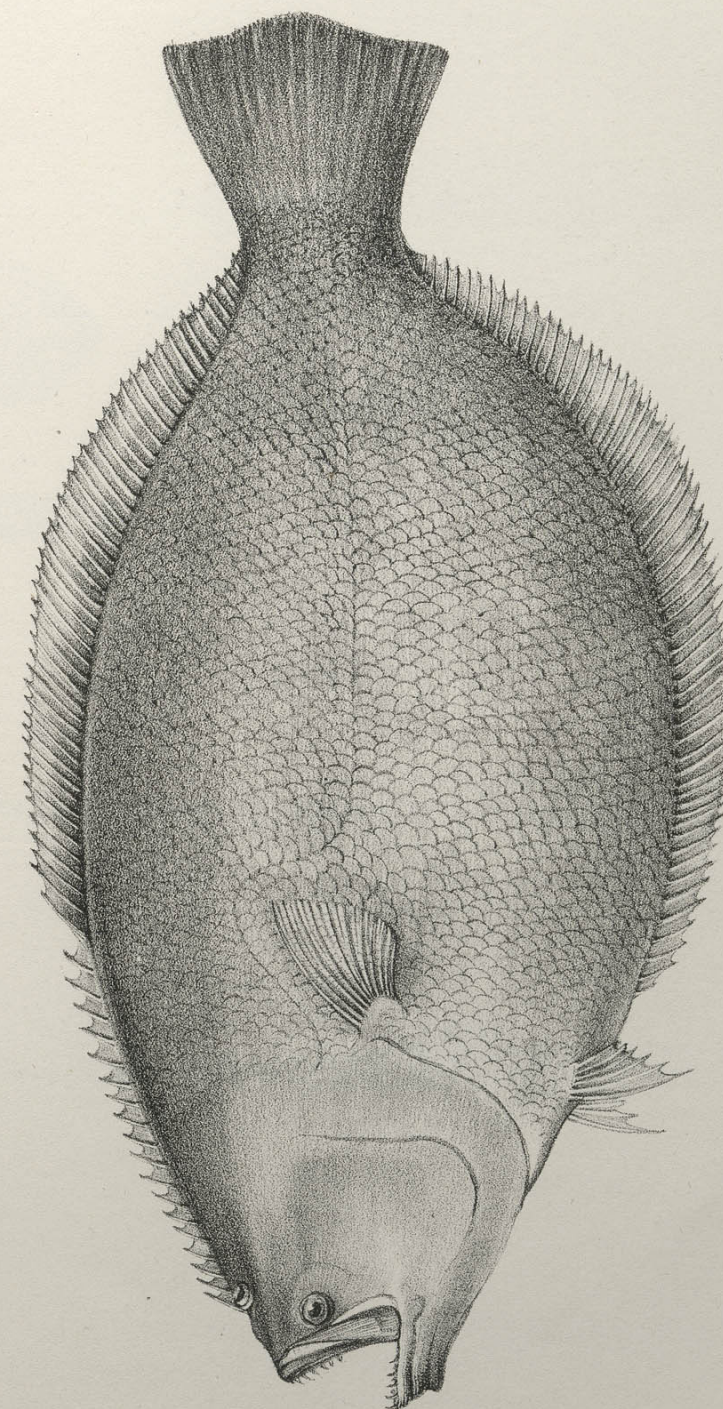


*Alosa pectinata*  $\frac{3}{4}$  Nat. size.  
a. Magnified Scale from nape.

From the same as above to the same.



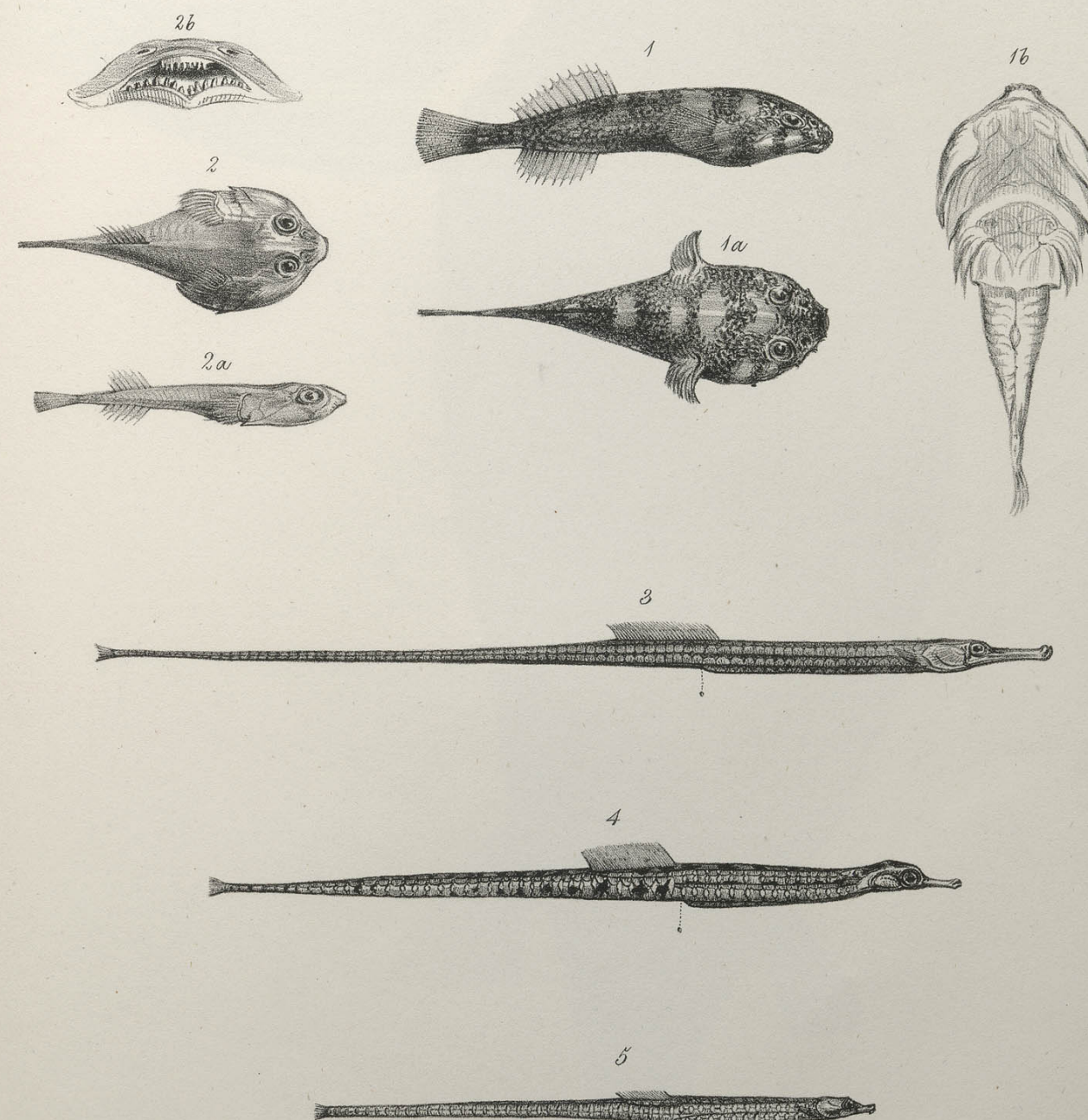
Fish Pl. 26.



*Hippoglossus kingi.*

*Eding from Nature by W. Horsford.*



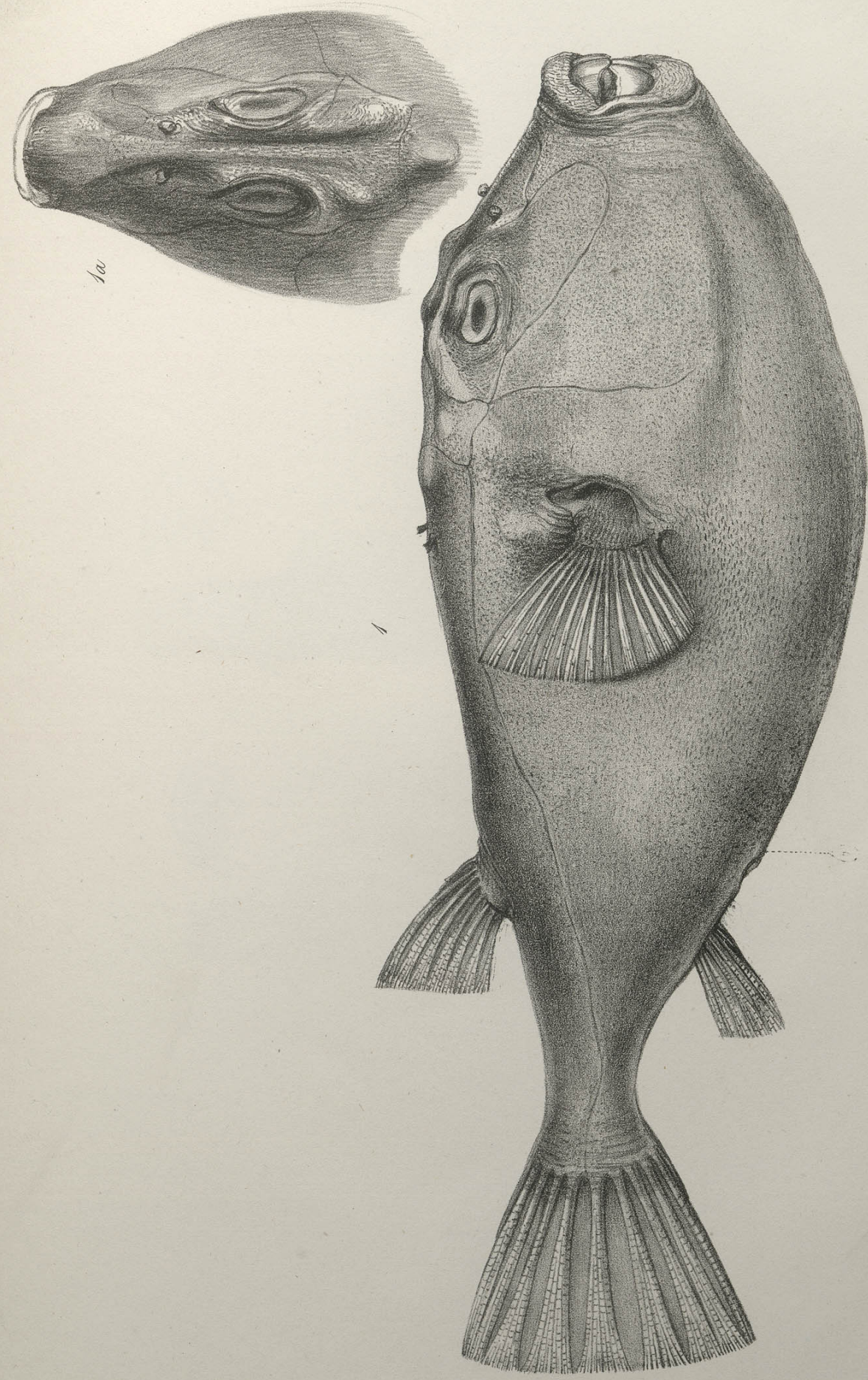


From Nature on Stone by W. Hawkins.

- |                                 |                                      |                                   |
|---------------------------------|--------------------------------------|-----------------------------------|
| 1. <i>Gobiesox marmoratus</i> . | 2. <i>Gobiesox pacilophthalmos</i> . | 3. <i>Syngnathus acicularis</i> . |
| 1a. " " Dorsal View.            | 2a. " " Lateral View.                | 4. " " <i>conspicillatus</i> .    |
| 1b. " " Under Side.             | 2b. " " Magnified View of Teeth.     | 5. " " <i>crinitus</i> .          |
- All Nat. Size.



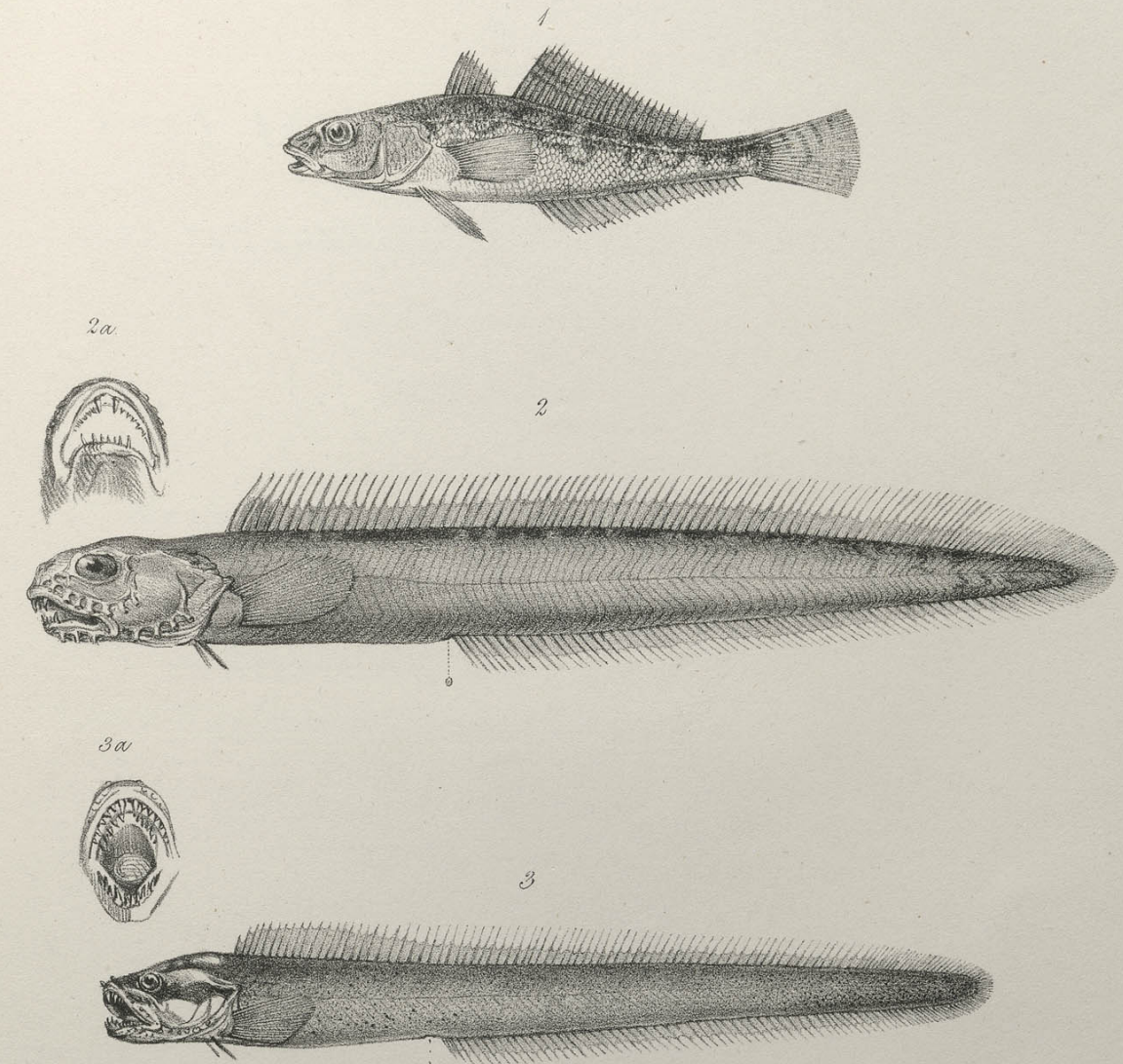
Fish. Pl. 28.



*Thiodon angusticeps.*  
a. .... Dorsal View  
Nat. Size

W. Hancock del.





Waterhouse Hawkins del.

- |                                  |              |
|----------------------------------|--------------|
| 1. <i>Aphritis undulatus</i> .   | } Nat. Size. |
| 2. <i>Thuocates fimbriatus</i> . |              |
| 2a. " Magnified View of Teeth.   |              |
| 3. <i>Phucocates latitans</i> .  |              |
| 3a. " " Teeth.                   |              |



x558.1

THE  
ZOOLOGY  
OF  
THE VOYAGE OF H.M.S. BEAGLE,  
UNDER THE COMMAND OF CAPTAIN FITZROY, R.N.,  
DURING THE YEARS  
1832 TO 1836.

PUBLISHED WITH THE APPROVAL OF  
THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

Edited and Superintended by  
CHARLES DARWIN, ESQ. M.A., F.R.S., V.P.G.S.,  
NATURALIST TO THE EXPEDITION.

PART V.  
REPTILES,  
BY  
THOMAS BELL, ESQ., F.R.S., F.L.S., &c.  
PROFESSOR OF ZOOLOGY IN KING'S COLLEGE.

LONDON:  
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MDCCCXLIII.



ZOOLOGY  
OF  
THE VOYAGE OF H.M.S. BEAGLE

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1832 to 1845

THE ZOOLOGICAL COLLECTIONS OF THE BEAGLE

CHARLES DARWIN, ESQ. M.A., F.R.S., &c.

EDITED BY THE AUTHOR

PART I

REPTILES

THOMAS BELL, ESQ. F.R.S., &c.

PRINTED BY STEWART AND MURRAY,

London:

Printed by STEWART and MURRAY,  
Old Bailey.

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V. { ——— tenuis.	
VI. { ——— signifer.	
VII. { ——— nigromaculatus.	
VIII. { ——— Fitzingerii.	
IX. { ——— cyanogaster.	
X. { ——— Kingii.	
XI. { ——— Darwinii.	
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XLI. { ——— Vauterii.	
XLII. { ——— Rhinoderma Darwinii.	
XLIII. { ——— Phryniscus nigricans.	
XLIV. { ——— Uperodon ornatum.	

ERRATA.—In Plate XIX. for "Hylonia" read "Hylorina."  
for "vanterii" read "Vauterii."

## P R E F A C E.

AMONGST the Reptiles and Amphibians obtained by Mr. Darwin, in the Voyage of the Beagle, there are several of great interest, not merely on account of their novelty as newly discovered species, of which there are nearly thirty, or as forming the types of genera not previously known, or of any remarkable peculiarity of form, structure, or habit, although in all these respects many of them are highly interesting; but more particularly as serving to establish or confirm several points connected with their geographical distribution.

From the structure of most of these animals and their consequent habits of life, circumscribed as they are for the most part in their locomotive powers, it might reasonably be predicated that they would, upon the whole, exhibit as distinct examples of restriction, with regard to their geographical boundaries, as any class of vertebrated animals; and that the intervention of seas and of mountains would be sufficient to limit the range of a species. Such is in fact usually the case; and not only is the same species not found in the Old and New Continents, but, with very few exceptions, not even on the opposite sides of the South American Continent, in which range Mr. Darwin's discoveries have principally been made. The occurrence, however, of *Bufo Chilensis* at Rio Janeiro and at Buenos Ayres on the eastern, and at Valparaiso and the Archipelago of Chonos on the western side of the continent, shows an extent of distribution exceedingly unusual if not absolutely unparalleled in this family. It is, however, still possible that further and more extended researches into the characters of the animals in question, and an examination of individuals from each locality at various ages, may prove that there are two species, which have been confounded with each other, and the anomaly may thus be removed.

But although the circumscribed range of a species may be accounted for by the reasons above mentioned, and others of a restrictive nature, it is not so easy to refer to any known or obvious cause the remarkable fact of a whole genus, consisting of numerous species, being thus geographically limited. Yet this is a



well-known and very common circumstance with regard to several groups of animals. In our present researches there exists a remarkable example of this fact in the genus *Proctotretus*, consisting, as is now known, of at least fourteen species, all inhabiting the western coast of South America. These facts, interesting as they are, have never been sufficiently investigated, although, it must be confessed, there are so many anomalies in relation to this subject, that we must despair of ever reducing the facts in question to any thing like fixed laws.

The close approximation of the Raniform and Hyliform groups of the Anourous Amphibia is strikingly illustrated by several new forms obtained by Mr. Darwin, which are so perfectly osculant between the two families, that it is difficult to assign them a decided location. And the addition of some bufonine forms in the family *Ranidae*, as at present constituted, and on the other hand of some amongst the *Bufonidae*, which are no less raniform in their general structure and habits, render it increasingly probable that the single character of the presence or absence of superior maxillary teeth, must be considered as insufficient to constitute alone a natural distinctive family character. There are several minor points bearing upon the natural arrangement of the Anourous Amphibians, which are illustrated by the characters of some of the species now first described, which will doubtless at some future time assist in the construction of a classification of these animals, bearing at least a nearer approximation to their natural arrangement than any that has hitherto been promulgated.

The Ophidians have been placed in the hands of Mons. Bibron, who is at the present time engaged in completing his admirable history of Reptiles, by the publication of those volumes which are devoted to this order; and it must be considered a fortunate circumstance that the delay which has taken place in the appearance of that portion of his labours, has thus afforded the opportunity of embodying in so perfect a work, the numerous discoveries of Mr. Darwin in this particular department of Erpetology.

T. B.

Hornsey, Sept. 2, 1843.

## REPTILES.

TRIBUS—EUNOTES. *Bibron.*

FAMILIA—TROPIDURIDÆ. *Mihi.*

TROPIDOLEPIDIENS. *Bibr.*

GENUS—Tropidurus. (In part.) *Weigmann.*

PROCTOTRETUS. *Bibr.*

CHARACTER GENERICUS.—*Pori femorales* nulli. *Pori præ-anales* in maribus tantum. *Crista dorsalis* nulla. *Dentes palatini*. *Squamæ* imbricatæ; *dorsales* carinatæ.

THE genus which I take the present favourable opportunity to illustrate, formed a section or sub-genus of the genus *Tropidurus*, according to Weigmann, who, however, was acquainted with two species only; *Pr. Chilensis* and *Pr. nigromaculatus*. Of the varieties of the former of these, that author has made no less than three species; but these have been very properly reduced by M. Bibron to one only. The last-named excellent erpetologist described several additional species, which had been brought from Chile, by M. D'Orbigny, and others; and I received, some years since, from Capt. King, three or four species which were found by him in the same locality, in the course of his well-known survey. The number of species altogether, hitherto known, amounts to ten; to which I have now the opportunity of adding four entirely new, forming part of the interesting collection of Reptilia made by Mr. Darwin. One of them, *Pr. Kingii*, was already in my collection, amongst those which were given me by Capt. King. The genus, therefore, of which, but lately, two species only were known, now consists of fourteen; and it is highly probable that more may yet be obtained by more prolonged and extensive investigation in the same districts.

B



Thus of the species now described two were known to Weigmann, and described by him, namely, *Chilensis*, and *nigromaculatus*. I received from Capt. King, *Chilensis*, *pictus*, *cyanogaster*, *Kingii*, *Fitzingerii*, and, from other sources, *Chilensis*, *pictus*, *Weigmannii*. Bibron describes the whole of these, excepting *Kingii*, and in addition to them *tennis*, *pectinatus*, *signifer*. In Mr. Darwin's collection are found all those described by Bibron, excepting *signifer*; and in addition *Kingii* now first described, and the following species never before observed, namely, *Darwini*, *gracilis*, *Bibronii*.

Although the form of the whole of the species much more nearly approximates that of the Agamidæ than most others, they are far removed from that family by several important characters, which it is unnecessary here to detail.

#### PROCTOTRETUS CHILENSIS.

PLATE I.—FIG. 1.

*Auribus margine anteriore dentato; collo non plicato; squamis dorsi magnis, rhombeis; acutè carinatis; serie unica squamarum supralabialium.*

*Calotes Chilensis*, Less. et Garn. Voy. de la Coquille, Zool. Rep. t. i. f. 2.

*Tropidurus Chilensis*, Weigm. Act. Acad. Cæs. Leop. Carol. Nat. cur. xvii. pp. 233. 268.

*Proctotretus Chilensis*, Bibr. Hist. Nat. des Rep. IV. p. 269.

Sun. *Tropidurus nitidus*, Weigm. l. c. p. 234, t. xvii. f. 2.

Var. *Tr. olivaceus*, Ib. l. c. p. 268.

Habitat, Guasco in Northern Chile.

DESCRIPTION.—Head short and broad, rostrum rounded, obtuse. Scales of the head large, and slightly raised, separated by distinct grooves. Superciliary ridge strongly marked, forming a distinct carina, composed of five or six narrow, elongated, obliquely imbricated scales. Nostrils large, nearly round. A single series of narrow scales between those of the upper lip and the orbit. Scales of the temples imbricated, rhomboidal and carinated. The opening of the ear oval, rather large, furnished anteriorly with three or four projecting scales, of which the upper one is the largest. The neck is short, robust and round, and without any lateral fold; in which it differs from every other species of the genus. The trunk is thick, rounded on the back and sides, flattened beneath, diminishing toward either extremity. The tail is ordinarily almost twice as long as the body, thick at its origin, and tapering regularly to the extremity, nearly round, excepting near the base, where it is slightly quadrilateral. The anterior feet when placed against the sides, extend backwards little more than mid-way between the shoulder and the groin; the posterior ones, stretched forward, reach the arm-pit.

The scales of the whole upper and lateral parts of the body, tail, and limbs, are loosely imbricated, large, rhomboidal, and furnished with an elevated carina, terminating in an acute point: those of the under parts are large, smooth, and obtuse.

This is one of the most beautiful species of the genus. The general form is robust and solid, forming a remarkable contrast with most other species of the genus. The surface is beautifully relieved by the fine, large and prominent scales, which are ranged in rows of perfect regularity, of which there are about eighteen on the back and side.

In colour and markings the individuals differ considerably; so as to have given rise to the opinion that they form three distinct species. Monsieur Bibron mentions two principal varieties, constituting the *Tropidurus olivaceus* and *Tr. Chilensis* of Weigmann. In the former, the colour is of a more or less bronzed bright green, or yellowish, according as the green or yellow colour prevails on the scales, each of which is green, with a border of yellow on each side: this border, according to M. Bibron, in some individuals of a blood-red colour. In some, especially in young individuals, there are several waved bands running transversely across the back.

In the second variety, says M. Bibron, the upper parts are either of an olive colour, with a golden glance in certain lights, or fulvous, with more or less of a yellow tint; and these have always four brown bands running the length of the body, appearing as if formed of a series of large spots united together. "The temples are marked with a black line, which extends from the posterior angle of the eye to the ear; another divides behind the occiput into two branches, which pass to the neck there to join the dorsal bands." There are other variations of colour, but scarcely deserving to be considered as constituting permanent or fixed varieties; the largest and finest specimen I have seen, which I received from Chile, is almost uniformly of a fine metallic green, without any markings.

#### DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	9
of the body .....	3	5
of the tail .....	6	0
Total length.....	10	4
Length of anterior extremity .....	2	0
of posterior extremity .....	1	2

This species would appear to be very common in Chile, from the numerous specimens from that country in the museum in Paris, which were brought by M. Gay, and by M. D'Orbigny. I have also received specimens from Capt. King. I find only one or two specimens in Mr. Darwin's collection, which he found at Guasco in Chile.



## PROCTOTRETUS GRACILIS. N.S.

PLATE I.—FIG. 2.

*Corpore gracili: capitis squamis lævibus, non imbricatis: aurium margine anteriore minutè bi-tridentato: collo vix plicato, squamis imbricatis: serie unicâ squamarum supralabialium: femorum facie posteriore omninò granulosâ.*

Habitat, Port Desire, Patagonia. Mr. Darwin, MS.

DESCRIPTION.—This new species is more slender and graceful in its general form than any other of the genus, not excepting *Pr. tenuis*, which in its general proportions it considerably resembles. The head is rather short, the anterior portion including the eyes being nearly an equilateral triangle. The muzzle is rounded. The scales of the head flat, rather large, consisting behind the nose of three series of 2, 3, 3, and 2, mostly hexagons. The nostrils are small and perfectly round, the superciliary ridge is very slightly marked; there is but a single row of small linear scales between the labial and suborbital. The ear is of moderate size, the anterior margin having two or three small projecting scales. The scales on the temples are imbricated and smooth; those of the sides of the neck also imbricated but very small. The neck is almost wholly without a fold, having merely a slight loose elevation of the skin. The scales of the back are small, rhomboidal, flat, the carina low, and not pointed at the extremity. They consist of about ten rows on each side of the median line. Those of the sides and belly are wholly without any notch on the free margin. The scales around the axillæ, and those of the posterior face of the thighs are granular. The tail is of considerable length, being more than twice the length of the head and body. The limbs are remarkably long; the anterior, when pressed against the side, reaching to the setting on of the thigh, and the posterior reaching forwards nearly to the ear. The general colour of the upper parts is greyish brown, with a yellow longitudinal fascia extending on each side from the upper edge of the orbit to some distance along the tail—and another from beneath the eye to the thigh. The middle of the back is lighter than the sides—beneath the second lateral line the colour fades, and on the belly it is pale buff or light yellow. The sides are dotted with black; and there are some dark waved lines and dots beneath the lower jaw.

This species is at once distinguished from every other by the fold of the neck being scarcely cognizable. It is however not so absolutely wanting as in *Pr. Chilensis*.

## DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	5
of the body .....	1	4
of the tail .....	3	8
Total length.....	5	7
Length of anterior extremity .....	0	7
of posterior extremity .....	1	1

A single individual of this species was taken by Mr. Darwin at Port Desire.

## PROCTOTRETUS PICTUS.

PLATE II.—FIG. 1, 2.

*Capite squamis parvis, lævibus, non imbricatis: aurium margine anteriore granuloso: serie unicâ squamarum supralabialium: squamis temporum subcarinatis, imbricatis: collo ad latera granuloso: squamis dorsalibus parvis, rhombis, carinâ humili, posticè obtusâ: facie posteriore femorum omninò granulosâ.*

*Proctotretus pictus*, Bibr. l. c. p. 276.

Habitat, Chile.

DESCRIPTION.—This species is moderately slender in its general form, but more fusiform than *Pr. tenuis*, which it much resembles in many of its characters. The head, which is rather short, and with the snout rounded, is covered with numerous small flat plates which vary exceedingly in their form and arrangement. The upper surface of the head is flattened, and the superciliary ridges distinctly marked. The temples are covered with small flat scales, which are slightly imbricated and carinated. The sides of the neck are granulated; and the anterior margin of the auditory cavity has small simple granulations. The scales of the back are distinguished from those of many other species by the flatness of the carina which is also obtuse posteriorly; they are small and closely imbricated. Those of the sides are almost without any carina, and those of the belly and throat small and very smooth, and the whole of them entire. The upper parts of the limbs are covered with scales similar to those of the back, but smaller. Those of the under part of the fore arm are similar, but beneath the thighs they are smooth and on the posterior part of the thighs they are wholly granular. The tail is furnished with quadrilateral carinated scales disposed in whorls. The margin of the cloaca has from two to four pores.

The colour of this species varies greatly. Bibron has enumerated three principal varieties, of which I have several specimens, which were brought home and presented to me by Capt. King, who obtained them during his survey of the coast of South America. These varieties, however, occasionally run into each other.

Var. A. General colour of the upper part bronzed or coppery, having a green longitudinal line on each side of the back, at the inner margin of which is a series of very distinct black dots. The sides of the neck and body are of a similar colour to the back, with indistinct black spots; beneath this part the ground colour becomes blue with black dots. The throat is blackish, and the inferior surface generally is very pale bluish green.

Var. B. This variety is described by M. Bibron as of a brown colour more or less dotted with yellow, and having a line of that colour along each side of the back, extending from the posterior angle of the eye to the base of the tail, and having on each side a series of angular black spots. Some of these spots on the upper part of the flanks, become dilated, so as to form a sort of vertical or transverse waved bands, with yellowish margins. On the neck there are small black lines, and the upper part of the head is brown with blackish spots. The upper surface of the legs and of the tail is brown with transverse bands composed of black dots. The



whole under surface is of a whitish colour, sometimes having a slight tint of orange towards the posterior parts, marbled with black.

Var. C. In this variety the general colour is dark brown, and the yellow or green longitudinal lines which characterize the former varieties are but slightly marked; but the black spots unite and form irregular transverse bands.

## DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	6
of the body .....	1	8
of the tail .....	4	6
	7	0

This specimen very much resembles in its more tangible characters, the *Pr. tenuis*; from which, however, it differs totally in the colouring, and in some measure also in the general form, which is more thick and robust.

Found in Chile by M. Gay, from whence I also received specimens from Capt. King, and other sources.—“Valparaiso.” Mr. Darwin.

## PROCTOTRETUS BIBRONII. N.S.

## PLATE III.—FIG. 1.

*Capite squamis lævibus, subconvexis; auribus ovalibus, margine anteriore unidentato; squamis temporum collicque rotundatis lævibus imbricatis; colli minimis; serie unica squamarum supralabialium; squamis dorsi rhomboideis, carinatis, posticè acuminatis; abdominis squamis omnibus integris; femorum facie posteriori omnino granulosa.*

Habitat, Port Desire. Mr. Darwin.

DESCRIPTION.—General form resembling that of *Pr. pictus* and *cyanogaster*. Head moderately short, obtuse, covered with rather large slightly convex scales; a single row of scales between the labial and the orbital. The anterior margin of the ear has a single tooth. The temples and the sides of the neck are covered with imbricated scales, which have no carina—those of the neck, especially those on the fold of the skin are smaller and more raised than the others. The scales of the back are rather large, rhomboidal, with a distinct carina, terminating in a point. Those of the abdomen and sides are all of them entire at the margin. The posterior surface of the thighs is wholly granular.

The only specimen obtained being a female, the number of pre-anal pores is not known.

The general colour of this species is brownish grey; a black longitudinal line runs down the middle of the back and tail. There are two series of black spots on each side, and a

small interrupted fascia of the same colour extends from the shoulder to the thigh. The belly is of an uniform dirty white.

This species approaches considerably to *Pr. cyanogaster* in general form and habit, and in many of its characters; but it may be at once distinguished from it not only by its colouring, but by the absence of even the slightest appearance of a carina on any of the scales of the temples or of the sides of the neck.

## DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	6
of the body .....	1	6
of the tail .....	3	4
Total length.....	5	6
Length of anterior extremity .....	0	7
of posterior extremity .....	1	1

Found by Mr. Darwin at Port Desire, in Patagonia.

## PROCTOTRETUS TENUIS.

## PLATE III.—FIG. 2.

*Capite squamis lævibus, non imbricatis; auribus magnis, margine anteriore sub-tuberculato; serie unica squamarum supralabialium; temporibus squamis rotundatis, imbricatis; collo granuloso; squamis dorsi parvis, obtusis, carinis minimis; squamis lateralibus exiguis, non imbricatis; facie posteriore femorum omnino granulosa.*

*Proctotretus tenuis*, Bibr. l. c. p. 279.

DESCRIPTION.—General form slender: head rather short and obtuse, covered with flattened smooth scales; anterior margin of the ears with one or more slight tubercles; temples covered with rounded imbricated scales, some of which are slightly carinated; sides of the neck, and above the shoulders granular; scales of the back small, slightly carinated, obtuse; those of the sides very small, very little imbricated; those of the belly small and smooth. The posterior surface of the thighs has no patch of imbricated scales, but is wholly granular.

The colour of the two specimens brought home by Mr. Darwin is so much obliterated, that I am obliged to have recourse to the account given by Bibron of the colour and markings of this species:—“Les deux sexes du *Proctotrète svelte* n'ont pas le même mode de coloration. Ni l'un ni l'autre ne portent, de chaque côté du dos, une bande longitudinale verte ou jaunâtre comme cela s'observe dans l'espèce précédente, (*Pr. pictus*.)

“Le mâle a le dessus de la tête nuancé de brun et de fauve, ou bien ponctué de jaune et de noirâtre. La région cervicale est, ainsi que le dos, vermiculée de noir sur un fond brun,



qui est lui-même semé de taches, soit bleuâtres, soit verdâtres, on ardoisées; quelquefois même on en remarque de jaunâtres. Presque tous les individus ont les côtés du cou marqués chacun d'une raie noire qui s'étend depuis le haut de l'oreille jusqu'à l'épaule. Les membres et la queue sont coupés en travers par des bandes onduleuses noirâtres, dont les intervalles se trouvent remplis par de taches, les unes bleuâtres, les autres de la couleur du cuivre rouge, la gorge tantôt est jaune, tantôt d'un beau vert métallique. Souvent elle est, de même que les autres régions inférieures de l'animal, vermiculée de gris-brun pâle sur un fond blanchâtres, glacé de violet.

“La femelle a toutes ses parties supérieures peintes d'un gris-brun fauve. Son cou et son dos portent deux séries parallèle de demi-cercles noirs, ayant leur bord convexe tourné de côté de la tête, et leur bord concave liseré de blanchâtre, ou bien d'une teinte plus claire que celle du fond de la couleur du dos. La région moyenne de celui-ci est quelquefois ponctuée de noir, ou tachetée de blanchâtre. Des lignes noires onduleuses traversent le dessus de la queue dont le dessous est souvent cuivreux. Les régions inférieures sont blanchâtres on bien colorées de la même manière que celles des individus mâles.”

Mr. Darwin's only observation on the colour of this species is, that it is “brownish black with transverse black bands.”

DIMENSIONS.		
	Inches.	Lines.
Length of the head.....	0	5
of the body .....	1	6
of the tail .....	2	1
Total length.....	4	2
Length of anterior extremity .....	0	8
of posterior extremity.....	1	3

Found at Valparaiso, and at Concepcion, in Chile.

PROCTOTRETUS SIGNIFER.

PLATE IV.—FIG. 1.

*Capite brevi, obtuso, depresso, squamis lævibus planis; aurium margine anteriore bi-tuberculato; squamis temporum imbricatis; colli granulatis; serie unica squamarum supralabialium; squamis dorsi laxis imbricatis, vix carinatis; facie posteriore femorum omnino granulosa. Dorso flavescenti-griseo, signis nigris, in seriebus quatuor longitudinalibus dispositis.*

*Proctotretus signifer*, Bibr. l. c. p. 288.

Head short, depressed, somewhat abruptly deflexed from the vertex—the scales flat, those of the supra-orbital arch being numerous, and less regular than in most other species. Between

the labial scales, and the long infra-orbital plate is a single series of rounded scales.\* The scales of the temples are rather large, somewhat rounded, slightly imbricated, and a few of the posterior ones having the vestige of an obtuse carina. The ear is rather small, the anterior margin having two slightly prominent scales towards the lower part.

The body is depressed; the tail moderately long, thick and slightly four-sided at the base, becoming much smaller and round towards the middle. The scales of the sides of the neck are small and granular; those of the upper parts of the body small, rhomboidal, rounded posteriorly, loose, much imbricated, and with an extremely low and inconspicuous carina. They are arranged in about twenty-two longitudinal series. Those of the sides are larger and quite smooth. The scales of the whole under part of the throat and belly are rhomboidal, smooth and much imbricated; a very few towards the sides of the abdomen are slightly notched at the apex. The under surface of the anterior and the hinder surface of the posterior extremities are covered with very fine granular scales; those of the upper surface of the members being rhomboidal, smooth, but slightly carinated and obtuse. The tail is covered with small rhomboidal scales which are considerably imbricated and distinctly carinated. The scales of the upper surface of the toes are smooth; those on their sides uni-carinated, and those beneath tri-carinated and broad.

The general colour of the upper parts is a yellowish grey, with black markings, which have somewhat the character, as Mons. Bibron observes, of Arabic letters. On the neck and back these markings are disposed in four longitudinal series; and there are small linear markings on the upper part of the shoulders and thighs. The tail is similarly marked, the under parts are whitish, with brown lines and spots.

DIMENSIONS.		
	Inches.	Lines.
Length of the head.....	0	6
of the body.....	1	5
of the tail .....	3	0
Total length....	5	1
Length of anterior extremity .....	0	8
of posterior extremity .....	1	2

This species is not found amongst the reptiles obtained by Mr. Darwin, but as it has never been figured, it appeared very desirable that this opportunity should not be lost. I am indebted to the great kindness of my friend M. Bibron for the loan of the only specimen which I have seen, and from which the accompanying figure is taken. It formed part of the zoological collections obtained by Mons. D'Orbigny for the French Museum.

\* Mons. Bibron states that there are two series, but on examining his specimen I find a single series only.



## PROCTOTRETUS NIGROMACULATUS.

PLATE IV.—FIG. 2.

*Capite brevi, squamis neque imbricatis nec carinatis, tecto; auribus margine anteriore tridentato; serie unicâ squamarum supralabialium; squamis temporum magnis, rotundatis, imbricatis; colli (et præcipuè plicæ) crassis, elevatis; facie posteriore femorum omnino granulosa; squamis nonnullis ad latera abdominis gulæque emarginatis; maculâ transversè oblongâ, nigrâ, supra regionem scapularem.*

*Tropidurus (Leiolaemus) nigromaculatus*, Weigm. Act. Acad. Cæs. Nat. cur. xvii. p. 229.

*Proctotretus nigromaculatus*, Bibr. l. c. p. 281.

Habitat, Coquimbo, Chile.

DESCRIPTION.—Head short, the muzzle rounded, rather obtuse; scales of the upper part of the head somewhat convex, smooth; a single line of scales between the labial and orbital; ears rather large, the anterior margin having three rather prominent scales, the middle one being the largest. Temporal scales somewhat large, smooth, rounded, and imbricated, those towards the upper part slightly carinated; those of the sides of the neck thick and elevated, those on the fold being rather acutely prominent; scales of the back carinated, the carina terminating in an acute point; a few of the scales at the sides of the abdomen and throat notched; the remainder of the scales of the under parts rhomboidal. The scales about the axilla and around the base of the shoulder are granular and very small, as are those of the posterior surface of the thighs, on which part there are no imbricated scales as in *Tr. Fitzingerii*. The tail is round, excepting at the base where it is slightly flattened; it is moderately long and slender. The anterior extremity placed against the side does not reach to the thigh; the posterior similarly placed reaches to the shoulder. The colour of this species is yellowish grey above, with a yellowish longitudinal line on each side the back, and two rows of black spots each margined with yellow behind. There is a large and distinct oblong black mark on the region of the scapula, from which circumstance the species takes its name. On the posterior surface of the thighs, towards the upper part, are three or four black dots placed in a line. The under surface is yellowish white with dark grey dots and lines under the chin and throat.

## DIMENSIONS.

	Inches.	Lines.
Length of the head . . . . .	0	5
of the body . . . . .	1	5
of the tail . . . . .	2	8
Total length . . . . .	4	8
Length of anterior extremity . . . . .	0	8
of posterior extremity . . . . .	1	2

This species was first described by Weigmann, and subsequently by M. Bibron, from specimens obtained by Gaudichaud from Coquimbo, at which place the single specimen brought home by Mr. Darwin was also obtained.

## PROCTOTRETUS FITZINGERII.

PLATE V.—FIG. 1.

*Capite squamis lævibus, non imbricatis; margine anteriore aurium granuloso; squamis supralabialibus ovalibus, in serie unicâ dispositis; squamis dorsalibus parum carinatis, postice obtusis. Facie posteriore femorum præcipuè granulosa sed portione, caudam versus, squamis majoribus, rhomboideis imbricatis tectâ.*

*Proctotretus Fitzingerii*, Bibr. l. c. p. 286.

Habitat, Patagonia.

DESCRIPTION.—General form thick and robust, the head short being nearly as broad as it is long. The muzzle slightly rounded. Scales of the head flat, small and numerous. Two scales only behind the rostral and between those which are pierced by the nostrils. Those over the nose and around the occipital scales being larger and more regularly arranged than the others. The ear is large, oval, the anterior margin having, towards the upper part, about three small, oval, granular, very slightly projecting scales. Temples covered with small, rounded or slightly hexagonal scales, which are scarcely imbricated. A single range of rather broad oval scales between the orbit and the upper lip. Scales of the sides of the neck, and above and behind the shoulder small, granular. The trunk thick; scales of the back very small, imbricated, very slightly carinated, and not pointed behind; those of the under parts smooth and rhomboidal. The legs are short and robust. The anterior pair, placed against the side do not extend backwards more than halfway to the thigh. The posterior pair do not quite reach the arms. The posterior face of the thighs is covered with granular scales, excepting a large patch near the groin rising to near the upper surface of the thigh, which are imbricated and rhomboidal, similar to those of the inferior surface of the thigh. The scales of the upper part of the toes are smooth, those beneath have one or two slight carinæ.

This species varies very much in colour; three or four tolerably distinct varieties may be noticed, but they often pass more or less into each other. As I have only one of these varieties in my possession, I quote the following description from Mons. Bibron's account of the specimens in the French Museum.

Var. A. Les parties supérieures sont grises, ou bien d'un brun marron plus ou moins clair. Il règne au long du cou et du dos quatre séries de taches noires, bordées de blanc en arrière. La queue et les membres offrent des bandes transversales anguleuse, d'un teint marron noirâtre, alternant avec des bandes semblables mais de couleur blanche. Les régions inférieures aussi sont blanches, excepté la gorge, qui est parcourue par des raies confluentes brunes. D'autres raies d'un brun marron sont imprimées verticalement, sur les lèvres.

Var. B. Cette variété se distingue de la précédente, en ce que le dessus de ses membres est ponctué de noirâtre, et que les quatre séries de taches qui ornent le dos de la première variété sont appliquées ici sur un fond fauve jaunâtre. Puis la gorge est verdâtre et le ventre noir, marbré de blanc.



Var. C. Le dessus du corps est uniformement peint d'un vert olive. Le dessus du cou, le milieu de la poitrine et celui du ventre sont d'un noir profond.

DIMENSIONS.		
	Inches.	Lines.
Length of the head.....	0	7
of the body .....	2	8
of the tail .....	4	2
Total length....	7	7
Length of anterior extremity .....	1	2
of posterior extremity .....	2	0

This species agrees with *Pr. Darwinii* and *Weigmannii*, and in some degree with *Pr. Kingii*, in having a portion of the posterior face of the thighs covered with imbricated scales. This is a character, which although existing in all those which I have named, is found to obtain in very different degrees; in *Tr. Weigmannii* being very distinctly marked, and in *Tr. Kingii* very slightly so, and in some specimens scarcely notable. It is probable, that var. B., and possibly A. also, of Mons. Bibron, may be *Pr. Kingii*; but I have not had the opportunity of ascertaining this from the actual examination of the specimens.

Found by Mr. Darwin at Port Desire, and at Santa Cruz, in Patagonia.

#### PROCTOTRETUS CYANOASTER.

PLATE V.—FIG. 2.

*Squamis capitis neque imbricatis nec carinatis; temporum imbricatis, subcarinatis, margine rotundato; aurium margine anteriore simplici; squamis dorsalibus rhombicis, laxis, carinâ posticâ acutâ; femorum facie posteriore omnino granulosa; corpore supra olivaceo, fascia utrinque longitudinali flavescenti; abdomine cæruleo.*

*Proctotretus cyanogaster*, Bibr. l. c. p. 273.

Habitat, Valparaiso, and Valdivia, Chile.

DESCRIPTION.—It has been well observed by M. Bibron that this species offers at first sight somewhat the general aspect of the genus *Algira*; the acute points of the dorsal and lateral scales and the general form giving very much that appearance.

The head is of moderate size, somewhat deflexed; the scales moderate, flat and smooth; those of the temples are slightly carinated, imbricated and rounded: those of the sides of the neck small, not granular, but rhomboidal and imbricated. There is but a single series of oblong scales between the labial ones and the orbit. The margin of the ear is entire and simple; the

scales of the back are lozenge-shaped, the carina of moderate height but prolonged into an acute point. Amongst those of the sides of the neck and belly are a few which are notched at the margin.\* The scales of the posterior surface of the thigh are wholly granular.

The proportions of the limbs vary in the two sexes. In the male they are considerably longer than in the female. In the latter the posterior extremity when placed against the side extends only to the arm, in the former it reaches to the ear. The ground colour of the back is chesnut brown or greenish brown, with a bright metallic green glance in certain lights; there are two light buff longitudinal fasciæ running the whole length of the body; the under parts are of a bright metallic blue colour. Mr. Darwin states that in one specimen there were emerald spots on the sides, which did not exist in another individual. This may possibly be a sexual peculiarity.

#### DIMENSIONS OF A MALE SPECIMEN.

	Inches.	Lines.
Length of the head.....	0	6
of the body .....	1	9
of the tail .....	3	3
Total length....	5	8
Length of anterior extremity .....	1	0
of posterior extremity .....	1	5

Found by Mr. Darwin at Valparaiso, and at Valdivia; the former is a very dry rocky country, with a scanty vegetation; whereas the latter is nearly level, covered with the thickest forest, and the climate exceedingly humid.

#### PROCTOTRETUS KINGII, N.S.

PLATE VI.—FIG. 1, 2.

*Squamis capitis neque imbricatis nec carinatis; supralabialibus in serie unicâ; aurium margine anteriore granuloso; interdum unidentata; squamis, dorsalibus carinatis, posticâ acuminatis, femorum facie posteriore præcipuè granulosa, sed portione parvâ, caudam versus, squamis parvis, rotundatis imbricatis tectâ.*

Habitat, Port Desire in Patagonia.

DESCRIPTION.—General form robust and full; the head short, thick, and passing into the neck without any distinct contraction; the muzzle rounded. Scales of the head larger in proportion than in *Pr. Fitzingerii*. Ear large, oval, with the anterior margin granular, sometimes slightly toothed. Scales of the temples of moderate size, imbricated, smooth, somewhat raised. A single range of oval moderate-sized scales between the labial and the orbital scales on the

\* This is contrary to the character given by M. Bibron, who states that the whole of these are entire.



sides of the neck, above and behind the shoulder small, granular, and some of them having a minute pore. Scales of the back of moderate size, larger than in *Fitzingerii*, rhomboid, having a rather prominent carina, and terminating in a distinct point. Scales of the under parts smooth and rhomboidal. The posterior surface of the thighs is for the most part granular, but a small portion near the groin is covered with larger imbricated scales; to a much smaller extent, however, than in *Fitzingerii*, and other species which possess this character.

The general colour of the upper part of this species is a rich dark brown, with whitish transverse bands and spots, having a black margin. I have figured in fig. 2, of Plate VI., a remarkable variety in which the bands are alternate black and white, and a broader and a narrower longitudinal fascia of a yellowish-white colour, run the whole length of the body on each side. The under parts are yellowish-white, with dark or almost black spots; under the throat bluish-gray with white spots.

## DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	8
of the body .....	2	3
of the tail .....	3	4
Total length....	6	5
Length of anterior extremity .....	1	1
of posterior extremity .....	1	4

This species much resembles *Pr. Fitzingerii* in many of its characters, as well as in its size. It may, however, be at once distinguished from it by the character of the scales of the back, which in this species are very distinctly carinated, of a rather elongated form, and pointed at the extremity; whereas in the other they are shorter, smaller, the carina is very slight, almost indistinct, and the posterior extremity is obtuse.

The tail in the larger figure of our plate is deformed, having been renewed. The specimen figured at (2,) in the same plate, is so remarkably distinct in the colours and marking, as to lead me to suppose that it may possibly be a different species.

## PROCTOTRETUS DARWINII.

PLATE VII.—FIG. 1, 2.

*Corpore subdepresso; capite squamis numerosis, parvis, subelevatis, lævibus non imbricatis; aurium margine anteriore integro; temporibus colloque granulatis; serie unâ squamarum supralabialium; facie posteriore femorum partim granulosa, partim squamis imbricatis tectâ.*

Habitat, Bahia Blanca, Northern Patagonia. Mr. Darwin.

DESCRIPTION.—The general form of this new species is similar to that of *Pr. Weigmannii*, but less elongate and somewhat more depressed, resembling in general appearance some of the forms of the genus *Sceloporus*. Head covered with rather small and consequently numerous scales, slightly elevated, and separated from each other by distinct and deep lines. A single series of small scales between the labial scales and the orbit. The exterior margin of the ear is entire and even. Scales of the temple and at the sides of the neck wholly granular, the latter very small. The scales of the back are small, flat, with a very low carina, and not pointed at the posterior extremity. There are about twenty rows of dorsal scales. The posterior surface of the thighs is granulated, excepting a small patch near the tail of imbricated scales, similar to those of the inferior surface, as in *Pr. Weigmannii*. The tail is of moderate length, and the scales which cover it are short, depressed, and obtuse in comparison with those of several other species. The pre-anal pores, which are peculiar to the male, are about ten in number.

The general colour is gray, with two light longitudinal lines on each side, and a row of black spots along the inner margin of the dorsal ones. The under surface is nearly white, with black dots under the throat.

The anterior legs, when stretched backwards against the side, reach about two-thirds towards the thigh; and the posterior when stretched forwards, extend to the shoulder.

## DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	5
of the body .....	1	6
of the tail .....	3	4
Total length....	5	5
Length of anterior extremities .....	0	8
of posterior extremities .....	1	2

It is at first sight extremely difficult to distinguish this species from younger individuals of *Pr. Fitzingerii*, from which, however, it differs in the more linear form of the supralabial scales, in the absence of imbricated scales on the lateral fold of the neck, the more entire margin of the ear. In the existence of a patch of larger imbricated scales on the posterior surface of the thighs, it resembles *Pr. Weigmannii*; from which, however, it may be at once distinguished by the single row of supralabial scales, the later species having a double row.

## PROCTOTRETUS WEIGMANNII.

PLATE VIII.—FIG. 1, 2.

*Capite squamis lævibus non imbricatis tecto; auribus rotundis margine anteriore*



*minutè granulato. Seriebus duabas squamarum supralabialium. Femorum facie posteriore partim granulosa, partim squamis minutis imbricatis tectâ.*

*Proctotretus Weigmannii*, Bibr. l. c. p. 284.

Habitat, Northern Patagonia and La Plata.

DESCRIPTION.—Head rather short, covered with numerous slightly raised scales, not carinated nor imbricated; snout rather obtuse and slightly rounded, nostrils semicircular. Two series of very small scales between the labial scales and the orbit. Ear of moderate size, the anterior margin furnished merely with minute granular scales. Scales of the temples flat and smooth. Fold on the sides of the neck distinctly marked, anteriorly bifurcated; the remainder somewhat waved. Sides of the neck granulated scales of the whole of the upper and back parts of the body and tail of moderate size, the carina little elevated and the point but slightly prominent. The scales of the inferior parts of the neck and body are smooth, polished, and imbricated, those towards the sides of the neck minutely emarginated. The scales of the limbs resemble those of the body; those of the upper surface being carinated and those beneath smooth. The posterior face of the thighs is generally covered with granular scales, but there is on this part near the tail, a distinct patch of imbricated scales resembling those of the inferior surface of the thighs, a character by which this species may at once be distinguished from all others. The anterior extremity placed against the side reaches about two-thirds of the distance towards the groin; the posterior extremity reaches forward to the shoulder.

COLOUR.—The back and sides are brownish gray, with a yellow longitudinal band on each side of the back, separating transverse black or dark brown bands of various size and form; and there is in most on each side a smaller interrupted yellow band. The under parts generally of a yellowish white, in some individuals sparsely dotted with black. Mr. Darwin says of some individuals of this species that they have “an orange-coloured gorge, and faint stripes of blue,” also “ash-grey with dark brown marks and specks of orange and blue.”

#### DIMENSIONS.

	Inches.	Lines.
Length of the head.....	0	5
of the body .....	1	5
of the tail .....	2	2
Total length....	4	2
Length of anterior extremity .....	1	1
of posterior extremity .....	0	8

This species was found by Mr. Darwin at Bahia Blanca and at Rio Negro, on the northern confines of Patagonia, and at Maldonado, near the mouth of the Rio Plata.

#### PROCTOTRETUS MULTIMACULATUS.

PLATE IX.—FIG. 1.

*Corpore subdepresso; capite squamis numerosis parvis tecto; auribus parvis, margine lævi; seriebus quatuor squamarum supralabialium; squamis temporum imbricatis; collo granuloso; femorum facie posteriore partim granulosa, partim squamis imbricatis tectâ.*

*Proctotretus multimaculatus*, Bibr. l. c. p. 291.

Habitat, Bahia Blanca, Northern Patagonia.

DESCRIPTION.—The body depressed and wide—the head triangular, the muzzle rather acute. Nostrils prominent and nearly round. Scales of the head very small and numerous; those of the temple rhomboidal and imbricated. There are four series of small irregular scales between the labial and sub-orbital. The sides of the neck are wholly granular; the scales of the body very small; those of the upper parts rhomboidal, flat with very low carina, and obtuse at the apex—beneath they are also small and rhomboidal; the posterior surface of the thighs is granular, but, as in some other species, there is, near the groin, a distinct patch of imbricated scales like those of the inferior surface. The tail is broad to some distance from the origin, and then tapers to the extremity. The scales of the tail are rather small, short and obtuse.

The anterior extremity placed against the sides reaches about two-thirds the distance towards the posterior, and the latter reaches forwards to the shoulder.

The ground colour of this species is gray, with numerous small black spots, some of which are bordered with white. The under parts are white, and in one specimen in Mr. Darwin's collection there are on the belly numerous distinct small black spots. His description of the colours is as follows:—“Colours above singularly mottled. The small scales are coloured brown, white, yellowish red and blue, all dirty, and the brown forming symmetrical clouds. Beneath white, with regular spots of brown on the belly.”

#### DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	8
of the body .....	1	8
of the tail .....	3	0
Total length ...	5	6
Length of anterior extremity .....	1	0
of posterior extremity .....	1	6

Found at Bahia Blanca, on the northern confines of Patagonia. The following remarks of Mr. Darwin on the habits of this species are very interesting. “In its depressed form and general appearance it partakes of some of the characters

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of the Geckos. Its habits are singular. It lives on the dry sand of the beach, at some distance from the vegetation, and the colour of the body much resembles that of the sand. When frightened it depresses its body, stretches out its legs, and closing its eyes tries to escape detection. If pursued it buries itself with great quickness in the sand; but as its legs are short, it cannot run very swiftly."

PROCTOTRETUS PECTINATUS.

PLATE IX.—FIG. 2.

*Capite squamis subæqualibus, rhomboideis, imbricatis, carinatis tecto.*

*Proctotretus pectinatus*, Bibr. Hist. Rept. IV. p. 292.

Habitat, Patagonia.

DESCRIPTION.—The scales of the head are narrow, closely imbricated, strongly but not acutely carinated, and the anterior ones arranged in somewhat of a radiating direction from the muzzle. There is but a single series of scales between those of the upper lip and the orbit, and these, together with all the scales about the head, partake of the carinated and elongated character already described. A single strong triangular scale and two smaller ones are placed on the anterior margin of the ear, which is narrow, oval and reniform. The scales of the temples and sides of the neck are rhomboidal, acute, carinated and imbricated. There is a longitudinal fold on each side of the neck and a transverse one anterior to the shoulder, behind which is a deep depression. The scales of the back and side are prominently and acutely carinated, those of the central line being rather more prominent than the others; and above this there is on each side a marked longitudinal lateral crest extending from beneath the eyes to the base of the tail. The scales constituting these crests are very prominent, narrow and acutely carinated. The scales of the belly are also imbricated and rhomboidal, but flat; those of the under surface of the hands and feet are carinated; and those of the toes have three carinæ. The body is somewhat depressed as is the tail at its commencement, becoming more rounded and rather abruptly smaller at some distance from its origin. The fore-foot reaches to about two-thirds of the distance from the shoulder to the side, and the hinder extremity thus placed extends to the shoulder.

The colours of this most elegant of all the species of the genus are very beautiful. "This is the most beautiful lizard," says Mr. Darwin, "I have ever seen; the back has three rows of regular oblong marks of a rich brown, the other scales symmetrically coloured either ash or light brown; many of them of a bright emerald green; beneath pearly, with semilunar spots of brilliant orange on the throat." I find in the specimens I have examined that the pectinated lateral crests are white, and the brown oblong marks of the back are bordered with a similar colour. There are always three white transverse lines across the head.

DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	7
of the body .....	1	7
of the tail .....	3	1
Total length.....	5	5
Length of anterior extremity .....	1	0
of posterior extremity .....	1	5

This species, as has been observed by M. Bibron, who first described it, may be at once distinguished from every other by the character of the scales of the head, which, instead of lying flat, with the edges in contact, are all of them imbricated and carinated. Another obvious distinguishing character, is the narrow line of prominent scales running the whole length of the body on each side, forming a sort of *pectinated* lateral crest, from which circumstance it has derived its name.

Found by Mr. Darwin, at Bahia Blanca, and Port Desire in Patagonia.

GENUS—DIPLOLEMUS. *Bell.*

*Caput breve, latum, subtriangulare. Aures parvæ, ovatæ, margine lævi. Nares magnæ, rotundæ. Collum infra transversè, ad latera longitudinalitèr plicatum. Corpus subdepressum, non cristatum. Cauda teres, breviuscula, lævis. Pedes breves, robusti. Squamæ capitis numerosæ, parvæ, rotundatæ, non imbricatæ—corporis atque caudæ suprâ minimæ, læves, convexæ, paulò imbricatæ, infra læves, planæ. Pori femorales et præ-anales in utroque sexu nulli. Dentes palatini nulli.*

The new genus which I have thus defined, resembles very closely, in most of its characters, the genus *Leiosaurus* of Bibron; from which, indeed, it scarcely differs, excepting in the absence of palatine teeth, and in the form of the suborbital plates, which in *Leiosaurus* are all distinct, and of nearly equal size; whereas, in the present genus, three of these are united to form one plate, resembling that in *Proctotretus*, and some other *Agamidæ*. In other respects the genera are very closely allied; but the existence or non-existence of palatine teeth, is a character of so much importance, that it appeared to me,—and in this opinion I am supported by M. Bibron, who examined the specimens with me,—that they should be considered as distinct. Both the genera are natives of South America. Of *Leiosaurus Bellii* (Bibr.) the only known specimens were presented to me by Capt. King, who obtained them during his survey, from whom also I obtained specimens of one of the species of the present genus, *D. Bibronii*.



DIPLOLEMUS DARWINII. *Mihi.*

PLATE X.

*Squamis capitis convexis; caudâ, corpore cum capite longiore.*

Habitat, Port Desire, Patagonia.

DESCRIPTION.—Head short, almost equilaterally triangular, rising obliquely from the muzzle to the vertex, then flattened. Nostrils large, round, each placed in front of the supra-orbital crest, and in a line between it and the centre of the muzzle. The ears are small, oval, the margin simple, and the membrana tympani superficial. The neck is considerably contracted; it has a longitudinal fold on each side formed by the confluence of two others, one of which arises from behind the angle of the mouth, and the other from above the ear, which is, as it were, enclosed between them; they coalesce a little behind the ear. There is also a distinct transverse fold on the throat, very similar to that in *Leiosaurus Bellii*. The body is moderately thick, somewhat depressed, and without the slightest appearance of a longitudinal crest, or any elevation along the median line. The tail is somewhat longer than the head and body, nearly round and tapering almost evenly from its origin to the apex. The fore legs are short and moderately robust, the toes short, nearly equal; the hinder legs moderately long. The former when placed against the sides, do not reach the thighs by nearly a third of the distance between the two limbs; the latter when directed forwards, just reach the axillæ. The cloacal covering is semi-lunar, turgid, and the margin quite simple.

Scales covering the upper surface of the head numerous, rounded, and considerably elevated; those between the two supra-orbital semicircles are in a double series. The occipital plate is oval, raised from the margin, hollowed immediately around the centre which is again raised like a minute tubercle. Above the labial scales, is a series of equal, rounded, oblong scales, and between these and the principal suborbital is a single series of smaller ones. Scales of the whole of the upper and lateral parts of the neck and body extremely small, slightly elevated, passing at the sides into a flatter and more expanded form. Those of the whole of the under parts are quite flat and imbricated. Beneath the anterior parts of the lower jaw, and behind the broad mental scales, are a series of flat, hexagonal scales on each side, passing backwards and outwards, the front pair large and oblong and the others diminishing by degrees. The scales of the throat are very small, those on the fold larger and acutely rhomboidal. The scales of the anterior part of the belly are also rhomboidal and those of the posterior portion hexagonal or nearly quadrate. The tail is covered by scales disposed in whorls, those on the median line beneath being larger than the others. Beneath each toe is a series of transverse hexagonal imbricated scales.

The colours and markings of this species are very difficult to be described, on account of the great irregularity of their disposition. The ground colour of the head is yellow, passing into grey on the back part. The anterior part has several small spots of a dark brown colour, and there is a larger one on each orbit, another between the eye and the ear, and others on the back part of the head extending to the neck. The middle of the back is reddish yellow, on

each side bluish gray, passing beneath into yellowish white. A series of very irregular transverse spots cross the yellow median portion of the back, and there are others on the sides; and these two series becoming confluent on the tail, form, with the yellow ground, alternate half rings of the two colours. The upper part of the legs has similar bands. The whole of the throat, belly, and inferior surface of the limbs and tail are yellowish white. There are numerous small blackish spots over these parts which are more distinct and linear on the throat, and becoming paler, smaller and round on the belly.

## DIMENSIONS.

	Inches.	Lines.
Length of the head .....	1	0
of the body .....	2	2
of the tail.....	3	8
Total length.....	7	0
Length of anterior extremity .....	1	1
of posterior extremity .....	1	6

Taken at Port Desire, on the coast of Patagonia.

DIPLOLEMUS BIBRONII. *Mihi.*

PLATE XI.

*Squamis capitis planis; caudâ corpore cum capite brevior.*

Habitat, Port Desire.

DESCRIPTION.—Head thick and clumsy, longer than it is broad, muzzle obtuse, supra-orbital arches slightly elevated. Nostrils as in the former species, in size, form, and situation. Ears sub-triangular, the margin simple. Neck considerably contracted, with a longitudinal fold on each side, and a distinct transverse fold on the throat. Body rather broad, slightly depressed, perfectly even, without any central crest or elevation. The tail is shorter than the head and body, slightly triangular at its base, tapering regularly to its extremity. Limbs of moderate length; the toes of each foot longer than in *D. Bibronii*, and those of the fore-feet more unequal, the third being the longest, then the fourth, the second, the fifth, and the first. The fore-legs placed against the side reaches to about two-thirds of the distance between the shoulder and thigh; the hinder foot placed in the same manner reaches to the axilla.

The scales of the head are quite flat, a character in which this species differs remarkably from the former, although in their number and arrangement they are very similar. The occipital scale is flat and hexagonal. Between the labial scales and the suborbital, there are, in addition to the regular series of larger supralabial scales, at least three distinct series of smaller ones; whereas in *D. Darwinii* there is but one.

The scales of the temples, the neck, the body, the limbs and the tail, are similar to those



of the former species in general form and arrangement, excepting that they are smaller and less elevated. Those beneath the anterior part of the lower jaw are much smaller; but the rest on the under parts are similar to the former.

The head is of a dull light-brown colour, with a few obscure darker spots. The general ground colour of the back is "bluish gray, tinged with rust colour;" there are five transverse bands across the back, which are composed principally of numerous, close, small, dark-brown spots, on a bluish-gray ground, darker than the intervals, and without any red tinge; and each band is marked on the posterior margin with strongly defined semilunar indentations, bordered with yellowish-white, or bright yellow. These bands are continued on the tail, where they become half-rings.

DIMENSIONS.		
	Inches.	Lines.
Length of the head .....	1	2
of the body .....	2	9
of the tail .....	3	5
Total length ...	7	6
Length of anterior extremity .....	1	4
of posterior extremity .....	2	1

GENUS—AMBLYRYNCHUS. *Bell.*

AMBLYRYNCHUS DEMARLII. *Bibr.*

PLATE XII.

*Crista supra cervicem elevatiore, supra dorsum humiliore; tuberculis verticalibus subdepressis, occipitalibus conicis; caudâ tereti.*

*Amblyrynchus Demarlii.* Bibr. Hist. Rept. IV. p. 197.

This species was first described by Mons. Bibron in the "Histoire des Reptiles," and so fully as not to require any detailed account of its characters here. It has not, however, hitherto been figured, and it is thought very desirable to embrace so good an opportunity of giving a representation of so interesting an animal. Its most important structural peculiarities will be alluded to in the account of the next species, which is an aquatic form, whilst the present is strictly terrestrial. The toes are long, compared with those of the other, and so unequal as to constitute essentially an ambulatory form.

By Mr. Darwin's observations we are now enabled fully to confirm Mons. Bibron's suggestion, that this species was from the Galapagos, and to establish the genus as strictly appertaining to that curious and interesting locality.

AMBLYRYNCHUS CRISTATUS. *Bell.*

*Crista supra humeros humiliore; digitis ferè equalibus subpalmatis; caudâ compressâ.*

*Amblyrynchus Cristatus.* Bell, Zool. Journ. 1825, p. 195. Tab. Supp. XII. Bibr. Hist. Rept. IV. p. 204.

I established the genus *Amblyrynchus* nearly eighteen years ago, from a stuffed specimen of the present species, which had been obtained by Mr. Bullock, Jun., in Mexico. I had never seen another specimen, until Mr. Darwin brought home a young one from the Galapagos, in excellent preservation in spirits, and thus established its true habitat, and enabled me to correct those errors in my description which arose from drying and bad stuffing. Mons. Bibron also took his description from my specimen, and thus necessarily fell into the same mistakes, of which the most important are those which relate to the form of the tail, and the structure of the feet. Thus the tail is described as "round, excepting towards the extremity, where it is flattened at the sides," whereas it is in fact much compressed throughout its whole length; and with regard to the toes no mention is made of their being partially united by a web or fold of skin, which is the case both on the anterior and posterior feet. These two characters so obviously point out a power of swimming, that the aquatic habits of the species might at once have been predicated, and it is exceedingly interesting to find, from Mr. Darwin's observations, that such is really the case. We have, therefore, two distinct forms—distinct equally in their structure and in their habits—in the two species now described; the one, *A. Demarlii*, being truly terrestrial, with lengthened, unequal, and distinctly separated toes and a round tail, and the present species as truly amphibious, having short, nearly equal and webbed toes, and a compressed tail.

A very interesting account of their habits, &c., is given by Mr. Darwin in his delightful Journal of the Voyage of the Beagle, p. 466 to 472, to which the reader is referred, and which exactly accords with the peculiarities of their respective structure just alluded to.

It is remarkable also, that whereas *Amblyrynchus cristatus* inhabits the coasts of all the islands, the other species is found only in the central portion of the group.



GENUS—LEIOCEPHALUS. *Gray.*

## LEIOCEPHALUS GRAYII.

## PLATE XIII.—FIG. 1.

*Crista dorsali elevata; caudâ sub-compressa; squamis ventralibus rhomboideis, lævibus; margine anteriore meatus auditorii quadridentato; squamâ occipitali magnâ.*

Habitat, Galapagos Archipelago.

DESCRIPTION.—Head, viewed from above, forming a nearly equilateral triangle, covered with irregular slightly raised scales. Supra-orbital ridge prominent, and covered with a series of elongated and imbricated scales. Occipital plate large, pentagonal, notched at its posterior margin. The anterior margin of the auditory passage is strongly quadridentate, from the existence of four long and rather narrow scales. Scales of the temple obtusely carinated, not imbricated; those of the back strongly and acutely carinated and disposed in numerous rows, converging backwards towards the dorsal crest. Ventral scales rhomboidal, not carinated. Dorsal crest elevated, composed of flat vertical scales, so closely placed as to constitute an almost continuous line, extending from the neck to the end of the tail. Tail somewhat compressed at the base, becoming nearly round towards the middle. Scales beneath the feet and toes carinated.

COLOUR.—The colour of this species is thus stated in Mr. Darwin's notes:—"Upper part clove brown, passing into black brown with black spots. Sides slightly tinted with orange; some of the scales of the crest near the head are white; belly nearly white; the whole of the throat before the fore legs glossy black. This is the most common variety in the Archipelago. The black spots are not unfrequently placed in waved transverse bars, and are sometimes arranged longitudinally.

## DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	9
of the body .....	2	8
of the tail .....	5	8
Total length .....	9	5

Of this species, one of the most beautiful in the whole order of Saurians, Mr. Darwin obtained numerous specimens, one only of which is fully adult. In the younger individuals the dorsal crest is low and almost inconspicuous. It differs very materially from either of the two species previously described, and I have dedicated it to Mr. Gray, who first distinguished the genus. Mons. Bibron, unaware that Mr. Gray had already constituted the genus under the name *Leiocephalus*, named it *Holotropis*. I have, however, retained the former name, as having the claim of priority.

It constitutes one of the numerous interesting novelties obtained by Mr. Darwin in the Galapagos. The specimens, which are of various ages, were taken in Chatham Island and in Charles Island.

GENUS—CENTRURA. *Bell.*

Caput breve, triangulare. Aures magnæ, anticè cutis plicâ, haud dentatâ, partim celatæ. Nares magnæ, rotundæ. Gula transversè subplicata. Collum atque corpus haud cristata; hoc depressum, latum, cute longitudinalitèr plicatâ. Cauda teres, basin versus subdepressa, squamis fortibus spinosis verticillatis. Squamæ capitis numerosæ, parvæ, rotundatæ, non imbricatæ—corporis minimæ, rotundæ, subconvexæ, læves. Pori femorales et præ-anales nulli. Dentes palatini.

The propinquity of this genus both to *Ophura* and to *Doryphorus* is very obvious. It differs, however, from both in several structural characters. From the former in the absence of denticulations on the anterior margin of the ear, and of a nuchal crest; from the latter in the presence of palatine teeth. Its place is probably between these two genera.

CENTRURA FLAGELLIFER. *Mili.*

## PLATE XIII.—FIG. 2.

DESCRIPTION.—Head almost equilaterally triangular, the muzzle rounded; scales of the head small, nearly equal, rounded, not imbricated, those of the temples subconical; nostrils round, large, confined to the nasal scales. Ears rather large, the tympanum lying beneath the surface, and partly concealed by an anterior fold of skin, which is not denticulated, as in *Ophura*. Skin of the neck folded at the sides, that of the body flaccid, and with strongly marked lateral folds, extending from the shoulder to the thigh. Scales of the neck and back very small, round, slightly convex, very smooth. Skin of the throat rugose, with a transverse pectoral fold not very strongly marked. Scales of the throat similar to those of the back; those of the belly broader and less convex; all perfectly smooth. Tail about the length of the head and body, flattened at the base, then round, surrounded with strong spinous verticillated scales, of which there are about fifty circles; beneath smooth. Legs of moderate length, strong, covered with small conical, imbricated scales. The toes compressed towards the extremity, and terminated with a strong, short, compressed nail.

COLOUR.—The colour can only be partially described, as the specimen has been long in spirits. It

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is of a dark brown colour above, with darker, obscure markings on the body. About the head are traces of green. The tail and limbs are rich brown, and the under parts dull, pale fuscous.

## DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	8
of the neck .....	0	4
of the body .....	2	5
of the tail .....	3	7
Total length ....	7	4
Length of anterior extremity .....	1	4
of posterior extremity .....	2	0

FAMILIA—GECKOTIDÆ. *Gray.*GECKOTIENS OU ASCALABOTES. *Bibr.*GENUS—GYMNODACTYLUS. *Spix.*GYMNODACTYLUS GAUDICHAUDII. *Bibr.*

## PLATE XIV.—FIG. 1.

*Squamæ mentali impari pentagonâ, scutiformi; squamarum labialium inferiorum paribus quinque, superiorum paribus sex; caudâ medio crassiore.*

*Gymnodactylus Gaudichaudii.* Bibr. Rept. III. p. 413.

This species was first brought from Coquimbo by Gaudichaud, after whom it was named by Mons. Bibron, who described it in his work; but as one specimen alone exists in the French National Collection, and as the species has never been figured, it is thought desirable that a figure should be given in the present work. The characters above given sufficiently distinguish it from all other species; but for a detailed description, the reader is referred to the "Histoire des Reptiles" above quoted.

## DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	5
of the body .....	1	4
of the tail .....	2	3
Total length .....	4	2

The specimens brought home by Mr. Darwin were from Port Desire, in Patagonia, and the following observations occur in his MS. notes:—"Centre of the back yellowish brown, sometimes with a strong tinge of dark green; sides clouded with blackish brown; in very great numbers under stones; makes a grating noise when taken hold of; after death loses its darker colours."

"A specimen being kept for some days in a tin box, changed colour into an uniform grey, without the black cloudings. I thought I noticed some change after catching and bringing home these animals, but could observe no instantaneous change."

I have considered these specimens as belonging to the species to which I have assigned them, because they exactly agree with Mons. Bibron's description. It is, however, very possible that an opportunity of comparing them with those obtained by Gaudichaud, would show them to be distinct, as it rarely happens that the same species of reptile is found on the opposite sides of the American Continent.

GENUS—NAULTINUS. *Gray.*

## NAULTINUS GRAYII.

## PLATE XIV.—FIG. 2.

*Omnino viridis; fronte subconcavo; squamulis capitis planis.*

DESCRIPTION.—Head thick, swollen across the posterior part, concave between the eyes, and forwards nearly to the snout, which is rounded. Scales of the head larger towards the fore part, nearly flat. Eyes round, large; ears longitudinally oval. Body covered with small nearly equal scales. Tail round, one-fifth longer than the body. Limbs short, the anterior, when placed against the side, reaching but little more than half way to the thigh; the posterior reaching about two-thirds the distance towards the shoulder. Toes short; on the anterior foot the first is the shortest, then the second, the fifth, and the fourth; on the posterior increasing in the same series; all compressed towards the extremity, and all furnished with small curved close claws.

The colour is a fine green.

It was taken at the Bay of Islands, New Zealand. It lives on trees, and is said to make a laughing noise.

This species greatly resembles *Naultinus Elegans*\* of Mr. Gray, of which a beautiful specimen is in the British Museum. Upon a comparison of the two,

\* See Fauna of New Zealand, p. 203. Zool. Misc. p. 72.



however, I find that they differ in the following particulars. In the present species the head is concave between the eyes, and forwards nearly to the snout; in the other, this part is quite plain; the scales of the head in this species are flat; in the other they are convex. The colour of this species is uniformly green, whereas *N. Elegans* has several markings of a yellow colour, each distinctly bordered with black.

FAMILIA — LACERTIDÆ.

GENUS—AMEIVA. Cuvier.

AMEIVA LONGICAUDA. Mihi.

PLATE XV.—FIG. 1.

*Squamis supra-humeralibus, rhomboideis, imbricatis; subfemoralibus transversim hexagonis; abdominalibus in seriebus decem longitudinalibus dispositis; caudâ, corpore cum capite plus quam duplò longiore, squamis medio carinatis, et ad margine subcarinatis.*

Habitat, Bahia Blanca, Northern Patagonia.

DESCRIPTION.—Head very narrow, much elongated and pointed, the vertex flattened; nostrils rather large, open, round, directed laterally, and placed in the centre of the naso-rostral plate; superciliary plates three in number, the central one the largest; suprahumeral scales rhomboidal, imbricated, not broader than long, in four series; those of the arm transversely hexagonal; the anterior surface of the thigh, and the inferior of the leg, covered with large hexagonal, somewhat imbricated, scales; caudal scales above quadrate, longer than broad, with a strong medial carina, and the lateral margins slightly raised; beneath smooth; tail very long. Anterior extremity placed against the body, reaching rather more than half way to the thigh; posterior extremity extending forwards nearly to the ear.

COLOUR.—The upper surface of this beautiful species is dark brown or blackish, with nine distinct white or yellowish longitudinal fasciæ extending through the whole length of the neck and body; tail with four of these lines. Under parts white.

DIMENSIONS.

	Inches.	Lines.
Length of the head .....	0	6
of the neck ..	0	3
of the body .....	1	4
of the tail .....	5	2
Total length.....	7	5
Length of anterior extremity .....	0	7
of posterior extremity.....	1	5

Found at Bahia Blanca by Mr. Darwin. The specimens are probably all of them very young; hence the longitudinal lines can scarcely be considered as permanent, as most species of the genus are beautifully lineated in the young state. The length of the tail, with its carinated scales, the general elegance of the form, the gracile form of the head, and the neat and distinct arrangement of the colours, render this one of the most beautiful species of this elegant genus.

The description of the colours given above, being from specimens which have been long in spirits, it is necessary to state that Mr. Darwin has the following notice respecting one of them—"On the sides two dark red streaks; tail red."

FAMILIA—ZONURIDÆ.

GENUS—GERRHOSAURUS. Weigmann.

GERRHOSAURUS SEPIFORMIS. Bibr.

PLATE XV.—FIG. 2.

*Scincus sepiformis*, Schneid. Hist. Amph. II. p. 191. Merr. Syst. Amph. p. 70. n. 1.  
*Gerrhosaurus sepiformis*, Bibr. Hist. des Rept. V. p. 384.

*Corpore cum caudâ longo, serpentiformi; pedibus parvis; squamarum submaxillarum pari secundo contiguis; squamis dorsalibus magnis, subrectangularibus, striatis, in seriebus tredecem, et ventralibus in seriebus octo dispositis.*

Habitat, Cape of Good Hope.

After a careful examination of the data from which the different synonyms of this species, and of *Gerrhosaurus flavigularis*, Bibr., have been derived, I am inclined to agree with this author, that the present is the true *Scincus sepiformis* of Schneider, and of Merrem, and not *Scincus flavigularis* as supposed by Wagler, Weigmann, and Gray. It is very fully described by Bibron in the "Histoire Naturelle des Reptiles," but it has not hitherto been figured. There is no notice of it in Mr. Darwin's notes, further than its having been obtained at the Cape of Good Hope.



## FAMILIA—SCINCIDÆ.

GENUS—CYCLODUS. *Wagler.*CYCLODUS CASUARINÆ. *Bibr.*

PLATE XV.—FIG. 3.

*Aurium margine anteriore simplici; squamis corporis lævibus, in seriebus xxiv dispositis.*

“*Kèneux de la casuarina*, Cocteau, Tab. Synopt.” (c. Bibr. Hist. Nat. des Rept. V. p. 749.)  
*Cyclodus casuarinæ*, Bibr. l. c.

As I have not the work of the lamented Dr. Cocteau by me, I quote the above reference from M. Bibron's work, in which this species is fully described. It differs from the other species of this curious genus in many minute characters of the scaling of the head, but the most tangible and obvious distinctive character consists in the number of series of scales, which does not exceed twenty-four, all around the body, whilst in the others, they amount to thirty-four or thirty-eight. It would appear that it is liable to some considerable diversity in colour and markings. That which M. Bibron describes, has “the head of a yellowish grey, the whole of the upper part of the body olive grey, and the inferior part whitish grey.” The specimen in the collection of the Zoological Society has the whole upper part of a brownish grey, with twelve black lines extending from the neck along the back and tail, corresponding with the sutures of the longitudinal series of scales. The under surface of the tail is marked by about thirty transverse, interrupted, black bands. The following is the description given by Mr. Darwin from his specimen when taken,—“Scales on the centre of the back light greenish brown, edged on their sides with black; scales on the sides of the body above greyer and with less black, below reddish: belly yellow, with numerous narrow, irregular, waving, transverse lines of black, which are formed by the lower margin of some of the scales being black; head above grey, beneath whitish.” Mr. Darwin adds, that the motion of the body, when crawling, resembles that of a snake. It is not very active. Coleoptera and larvæ were found in its stomach. “It is common in the open woods near Hobart Town in Van Diemen's Land.”

## CLASSIS—AMPHIBIA.

ORDO—ANOURA.

FAMILIA—RANIDÆ.

GENUS RANA.

RANA DELALANDII. *Bibr.*

PLATE XVI.—FIG. 1.

*Dentibus palatinis in serie transversâ, medio interruptâ, dispositis; membris posterioribus corpore cum capite duplò longioribus; pedibus posticis gracillimis, semipalmatis.*

*Rana Delalandii*, Bibr. Hist. Rept. VIII. p. 388.

DESCRIPTION.—Head elongate, depressed. Eyes large, not prominent. Tympanum nearly round. Palatine teeth in two simple series, commencing at the inner side of the anterior margin of the posterior nares, and extending towards each other in a transverse direction, leaving between them a space of about half the length of each. Tongue not quite as long as it is broad. Body somewhat depressed, and with the head forming an almost uninterrupted ellipse. Skin of the back, with several small longitudinal folds. Anterior legs, when placed against the sides, reaching to the thigh. Fingers very slender, and of nearly equal length. Posterior limbs fully twice as long as the head and body. Toes extremely long and slender, and connected by a membrane by about half their length.

COLOUR.—The general colour of the upper parts is a rich brown, with darker brown and white markings. A white median fascia extends the whole length of the head and body; another fascia of the same colour and of very irregular figure on each side, passes backwards and downwards from above the shoulders, and loses itself in the pale colour of the abdomen. There are several smaller white lines and spots, and others of a dark rich brown, particularly a large mark of the latter colour behind the eye, including the tympanum. The thighs and legs are elegantly banded with similar colours. The under side is whitish.

## DIMENSIONS.

	In. Lines.
Length of the head and body.....	1 8
of anterior extremities .....	1 1
of posterior ditto .....	3 7

This species was first discovered at the Cape of Good Hope by M. Delalande, and named after him by Mons. Bibron. Mr. Darwin found it in the same locality. It is now figured for the first time.



## RANA MASCARIENSIS.

PLATE XVI.—Fig. 2.

*Dentibus palatinis in fasciculis binis obliquis distantibus, ad marginem anteriorem narium posteriorum attingentibus; tympano circulari, mediocri; digitis posticis usque ad phalanges penultimas connexis: plantis tuberculo unico; cute dorsi lævi, longitudinaliter plicatâ; suprâ fusco-rufescens, fasciâ longitudinali pallidâ.*

*Rana Mascariensis*, Bibr. Hist. Rept. VIII. p. 315.

Habitat, the Mauritius.

This pretty species of the typical genus of the family was described by Bibron, but has not hitherto been figured. It was found in Mauritius, on swamps near the sea, by Mr. Darwin, who remarks on the extraordinary height of its leaps. It has also been found in the Seychelles, Madagascar, and the Island of Bourbon.

GENUS—LIMNOCHARIS. *Bell.*

*Lingua ovalis, integra, margine posteriore libero. Dentes palatini utrinque in fasciculis duobus dispositis, quorum alter ad marginem anteriorem narium interiorum, alter pone nares interiores, prope arcum maxillarem. Nasus terminalis, truncatus, ultra labium productus. Tympanum conspicuum, circulare. Cutis omnino lævis. Digni anteriores liberi, posteriores ad basin tantum palmati.*

The genus *Limnocharis* is remarkable for the existence of palatine teeth in a part of the mouth in which they have never been observed in any other amphibian. Not only is there a small group or line of these contiguous with the anterior margin of the posterior nares,—a situation in which they are found in some other genera of *Ranidæ*, but there is also a group of them placed at some distance behind the posterior margin of these openings, and close within the rise of the maxillary arch. This genus, of which one species only is at present known, will probably be most naturally placed between the true *Ranæ* and certain of the *Cystignathi*.

LIMNOCHARIS FUSCUS. *Mihi.*

PLATE XVI.—Fig. 3.

Habitat, Rio Janeiro.

DESCRIPTION.—Head semi-oval, depressed, as broad as it is long. The muzzle truncated, extending beyond the lips, which it overhangs. Tongue oval, entire, free at the posterior margin. Palatine teeth in two parcels on each side; one consisting of very few at the anterior and inner margin of the posterior nares, the other behind those openings, in the angle formed by the maxillary arch and the orbits. Posterior nares large and oval. Tympanum conspicuous, nearly circular. Skin every where perfectly smooth, without glands or pores. Anterior legs of moderate length and size. The fore-arm rather longer than the upper arm. Fingers of moderate length, wholly detached. Hinder legs little more than one-third longer than body. The toes separate, excepting a slight rudiment of a connecting membrane at their base, which extends, though very narrow, along their sides, the extremity very slightly notched.

COLOUR of the upper part rich dark brown. The thighs lighter, obscurely banded with dark brown. Under parts pale blueish grey. The throat dotted with brown.

## DIMENSIONS.

	In.	Lin.
Length of the head and body .....	1	4
of the anterior extremities .....	0	7
of the posterior extremities .....	1	8

Found in brooks at Rio Janeiro by Mr. Darwin, who states that it is infested with acari; and I observe, in the specimen under examination, several marks in the skin, from whence these have been taken.

GENUS—CYSTIGNATHUS. *Wagler.*CYSTIGNATHUS GEORGIANUS. *Bibr.*

PLATE XVI.—Fig. 4.

*Dentibus palatinis perpaucis, in fasciculis binis approximatis, pone nares posteriores; lingua integrâ, oblongâ; tympano celato; pedibus posterioribus non palmatis.*

*Crinia Georgiana*, Tschudi Class. Batrach.

*Cystignathus Georgianus*, Bibr. Rept. VIII. p. 416.

This species, which formed the type of Tschudi's genus *Crinia*, was separated by him from *Cystignathus* on account of the form of the tongue, the non-

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appearance of the tympanum, the paucity of palatine teeth, and the total absence of an interdigital membrane on the hinder feet. These characters being either merely comparative or unimportant, were not considered by Bibron as sufficient to warrant a generic separation, and I have followed him in retaining the species amongst the *Cystignathi*. It was first discovered by Messrs. Quoy and Gaimard at King George's Sound, in Australia, where it was also obtained by Mr. Darwin. It is a beautiful species; the back being of a rich brown colour, with a pale orange fascia extending along the sides from the eye to the thigh, becoming bright orange on the flanks. Thighs and legs banded with rich deep brown and bright orange.

GENUS—BORBOROCETES. *Bell.*

*Lingua ovata, posticè libera, rotundata; anticè subacuminata. Dentes palatini in fasciculis binis plùs minùsve obliquis, pone nares posteriores positi. Tympanum celatum. Digiti anteriores haud palmati; posteriores ad basin tantùm cute connexi. Glandulæ cutaneæ nullæ. Sacculi vocales (maris) utrinquè sub lingua nascentes.*

The two species on which I have founded this genus approach so nearly to some species of *Cystignathus*, that it is not without hesitation that I determine on considering them as typical of a new generic form. The principal characters on which I have founded the distinction are the position of the palatine teeth, the form of the tongue, the concealment of the tympanum, the absence of glands and pores on the skin, and the connexion of the base of the hinder toes by a rudimentary palmar membrane. It is true that some of the species of *Cystignathus*, as that genus is at present constituted, agree with the present form in some or other of these particulars; but upon the whole they are sufficiently distinct; and in fact the genus *Cystignathus*, as left by M. Bibron, appears to me to stand in need of revision and dismemberment. The species constituting the genus now proposed, are however both new. The genus *Borborocætes* will probably stand, in its natural affinities, between *Cystignathus* and *Cycloramphus*, from the latter of which it differs in the situation of the palatine teeth, in the degree to which the hinder feet are webbed, and the comparative length of the hinder legs. The two latter characters are of importance as indicating a difference of habit; and we find that *Cycloramphus* has proportionally short hinder limbs, with the toes

extensively palmate, whilst in *Borborocætes* the hinder legs are much longer, and the toes scarcely at all webbed. The former structure indicates a greater power of swimming, and the latter of leaping.

BORBOROCÆTES BIBRONII. *Mihi.*

PLATE XVII. FIG. 1.

*Dentibus palatinis in fasciculis distantibus obliquis pone nares posteriores positis; palmis bituberculatis.*

Habitat, Chiloe and Valdivia.

DESCRIPTION.—Head depressed, the vertex slightly concave between the orbits; front (space included between two lines drawn from the anterior corner of the orbits to the point of the nose) triangular and distinct. Nostrils lateral. Eyes rather prominent. Tongue broad, ovate, acuminate in front, behind entire and rounded, the posterior half and the sides detached. Palatine teeth in two oval parcels, direct obliquely backwards and inwards, and situated at some distance behind the line of the posterior margin of the nares. Tympanum concealed. Body rather depressed and short. Skin smooth and without pores or glands, excepting on the posterior and inferior surface of the thighs, where there are some small granular elevations. Fore legs two-thirds the length of the head and body. The fore-arm rather larger than the upper arm. The fingers entirely separated, the third considerably the longest. A small tubercle under each joint, and two on the palm near the wrist. Length of the hinder legs to that of the head and body as 5 to 3, or rather more. Toes connected only at their base. A small tubercle under each joint, and a very depressed one at the base of the inner toe.

COLOUR of the upper parts fuscous, with a lateral fascia extending from the orbit nearly to the thigh, of a dark-brown colour, bordered with whitish; and another of an elongated triangular form on each ilium. Legs with transverse incomplete faciæ of the same colour. Under parts grey, with numerous brown dots.

DIMENSIONS.

	In.	Lines.
Length of the body and head .....	1	5
of the anterior extremities .....	1	0
of the posterior extremities .....	2	6

Taken at Valdivia and at Chiloe, in a thick forest, by Mr. Darwin.



BORBOROCÆTES GRAYII. *Mihi.*

PLATE XVII.—FIG. 2.

*Dentibus palatinis in fasciculis subcontiguis paulò obliquis, pone nares posteriores positis; palmis non tuberculatis.*

Habitat, Valdivia.

This species considerably resembles the former in most of its characters. The palatine teeth, however, form at once a certain and tangible distinction, and there are some minor points in which they differ, sufficient at a glance to determine them. The head in the present animal is broader than it is long; in the former the breadth is only equal to its length. The palms are in this species without conspicuous tubercles; in the other there are two, although very small.

In colour it differs much from the former. The general colour is a rich fuscous brown, rather paler beneath; the flanks, the throat and belly, and the whole of the thighs and legs, with various white markings, those of the throat and belly being the smallest. This species was found in the forest, in Valdivia.

GENUS—PLEURODEMA. *Tschudi.*

I have thought it right to follow Tschudi in separating from the genus *Cystignathus* of Wagler, such species as have large and conspicuous lumbar glands, particularly as they all agree in possessing a much more bufonine aspect than the others. The discovery of three new species, all agreeing in these characters with *Pleurodema Bibronii* of Tschudi, increases the importance of the grounds upon which this separation is made.

PLEURODEMA DARWINII. *Mihi.*

PLATE XVII.—FIG. 3.

*Dentibus palatinis paucis, minimis; lingua subcordatâ, vix emarginatâ; glandulis lumbarum magnis, rotundis, convexis; digitis posticis ad basin tantùm membranâ connexis; dorso sparsim tuberculato-glanduloso; suprâ pallidè virescens, maculis fusco-olivaceis.*

Habitat, Maldonado.

DESCRIPTION.—Head triangular, rather broader than long. Muzzle rounded. Eyes slightly prominent. Tongue somewhat heart-shaped, scarcely emarginated behind. Palatine teeth very few, and with difficulty perceptible, placed in two small groups between the posterior nares. Body thick and broad, with numerous glandular tubercles scattered over the surface, principally on the anterior parts, and assuming somewhat of a longitudinal arrangement. Lumbar glands large, round, and prominent. Legs robust and short. Toes of the fore feet wholly separate, with a small tubercle under each joint, and two larger ones at the hinder part of the palm. Hinder toes, with a rudimentary membrane at the base, a small tubercle under each joint; the first and second toes very short. A conical tubercle at the inner, and another at the outer side of the metatarsus.

COLOUR.—The upper surface is beautifully marbled with dark olive or black, on a light-green ground; some of the markings assume somewhat of an ocellated form, and approach to a symmetrical arrangement. The lumbar glands are more strongly coloured than the other parts, the centre being black, and nearly surrounded by a bright line of very light green, or nearly white. The thighs are numerously banded with the prevailing colours, and a tinge of orange or red. Beneath pale; in some specimens blackish under the chin.

The aspect of this species is remarkably bufonine; and this character is increased by the numerous glandular tubercles on the surface of the body, and pores about the parotid region. It is, doubtless, similar in its habits to many of the toads.

## DIMENSIONS.

	In.	Lin.
Length of the head and body.....	1	4
of the anterior extremities .....	0	8
of the posterior extremities .....	1	7

It was repeatedly found by Mr. Darwin at Maldonado, near the mouth of the river La Plata.

PLEURODEMA ELEGANS. *Mihi.*

PLATE XVII.—FIG. 4.

*Dentibus palatinis prominentibus, in fasciculis binis ovatis obliquis dispositis; lingua rotundâ integrâ; glandulis lumbarum ovalibus, valdè convexis; digitis posticis haud palmatis; dorso tuberculato-glanduloso, fusco, nigro obscurè maculato, fasciâ longitudinali pallidâ.*

Habitat, Valparaiso, Valdivia, and Archipelago of Chiloe.

DESCRIPTION.—Head semi-elliptic, as broad as long. Muzzle rounded. Eyes very slightly prominent. Tongue large, round, entire, very thick. Palatine teeth prominent, disposed in two



oval groups, extending obliquely backwards and inwards, but separated by a considerable interval. Body somewhat depressed and elongated, with many prominent glandular tubercles, and with pores about the parotid region. Lumbar glands of moderate size, of an elongated oval form, and very convex. Legs rather slender, the anterior feet with the third toe considerably the longest; a small tubercle under each joint of all the toes, and several small inconspicuous ones on the palm; hinder legs rather elongated, the toes long, particularly the fourth, the first very short; a small tubercle under each joint; the inner metatarsal tubercle prominent, the outer one inconsiderable.

COLOUR.—The markings of this species are very elegant and striking. The ground colour of the upper parts is a rich brown, with darker cloudings and marks; a light yellowish longitudinal line running all the length from the nose to the extremity of the body, a very irregular fascia on each side of the same colour enclosing a brown oblong spot on the upper lip, another just behind the tympanum, and two others on the sides; there is also a brown fascia from the extremity of the nose to each eye; the lumbar glands are black and yellow, distinctly marked. The limbs are obscurely banded with brown and pale yellowish. The colours in some specimens are more obscure than in that figured, and they appear to lose their clearness with age.

The following are the colours of the brighter individuals according to the observations of Mr. Darwin:—"Yellowish and broccoli-brown, with darker brown marks; broad medial dorsal line, pale gallstone yellow; lumbar glands saffron yellow and jet black." Another specimen was "ash-grey with blackish brown marks."

## DIMENSIONS.

	In.	Lines.
Length of the head and body.....	1	8
of the anterior extremities .....	1	0
of the posterior extremities .....	2	4

The general habit of this species is much more in accordance with its relation to the *Ranidæ* than that of the other species of the genus. Its general form is more elongated and depressed, and the limbs, particularly the hinder ones, are longer in proportion to the body. It is certainly very near *Pl. Bibronii* of Tschudi, but still undoubtedly distinct.

PLEURODEMA BUFONINUM. *Mihi.*

PLATE XVII.—Fig. 5.

*Dentibus palatinis prominentibus, in fasciculis binis ovalibus, obliquis, dispositis; linguâ subcordiformi, submarginata; glandulis lumborum maximis, ellipticis, planis; digitis posticis dimidio ferè palmatis, marginatis; dorso glandulis parvis instructo, fusco-griseo maculis, nigris, lineâ longitudinali pallidâ.*

Habitat, Port Desire, Patagonia.

DESCRIPTION.—Head short. Muzzle rounded. Eyes prominent. Tongue thick, slightly heart-shaped, scarcely notched on the posterior margin. Palatine teeth prominent, in two oval groups, converging backwards. Tympanum rather small, perfectly round, conspicuous. Parotid glands distinct. Body thick and broad, with small glandular tubercles dispersed over the surface, particularly at the anterior part. Lumbar glands extremely large, elliptic-ovate, flat. Legs of moderate length, rather robust. Anterior toes separated, excepting at the base; a small tubercle under each joint, and several very small ones on the palm; hinder toes united to about half their length, and bordered on each side to the extremity; metatarsal tubercles prominent; soles of the hinder feet with many minute tubercles.

COLOUR.—The upper surface of this species is of a brownish grey colour, sometimes greenish brown or dark olive, and with numerous irregular spots of dark-brown or black. Thighs and legs with fasciæ of the same colour. Beneath yellowish white; in some with numerous blackish dots under the throat.

## DIMENSIONS.

	In.	Lin.
Length of the head and body .....	1	8
of the anterior extremities .....	1	0
of the posterior extremities .....	2	3

Found by Mr. Darwin at Port Desire, in Patagonia, and high up the river Santa Cruz—"probably," says Mr. Darwin, "the most southern limit for this family."

GENUS—LEIUPERUS. *Bibr.*LEIUPERUS SALARIUS. *Mihi.*

PLATE XVIII.—Fig. 1.

*Supra nigricans, lumbis maculis 3 vel 4 nigris, albo-marginatis.*

DESCRIPTION.—The head is short, the opening of the mouth small, the tongue rather thick, very slightly emarginate behind, and with the posterior margin free. The eyes small; the tym-



panum not very conspicuous; there is a trace of a parotid gland on each side of the neck. The body is rather thick, and the limbs proportionally short. The hinder toes are only connected at the base by a rudimentary membrane, the first four gradually increasing in length, and placed along the side of the matatarsus, one beyond the other; the fifth on the same line as the fourth, but not more than half its length. The metatarsal tubercle is rather prominent, and there are small subarticular tubercles on the toes of all the feet.

COLOUR.—The colour of the upper parts is brownish black. On each side near the thigh are three or four perfectly round black spots, each surrounded with a white line. The under parts whitish.

Of this second species of a rare and remarkable genus, one specimen only exists in Mr. Darwin's collection. It is only the third known instance, in the family of the *RANIDÆ*, of the absence of palatine teeth; the others being *Oxyglossus Lima* of Tschudi, and *Leiuperus marmoratus* of Bibron. The present genus must be considered as nearly approaching the family of the *BUFONIDÆ* in the absence of palatine and the extreme minuteness of the maxillary teeth, in the extremely small gape of the mouth, the thick form of the body, the shortness of the limbs, and the existence of rudimentary parotid glands. I have not had an opportunity of comparing this specimen with those on which Bibron founded the genus, but I cannot doubt the specific distinction between them.

## DIMENSIONS.

	In.	Lin.
Length of the head and body .....	0	9
of the anterior extremities .....	0	5
of the posterior extremities .....	1	1

It was found by Mr. Darwin at Port Desire, and its habitat is very remarkable. "It is bred in and inhabits water far too salt to drink."

GENUS—PYXICEPHALUS. *Bibr.*PYXICEPHALUS AMERICANUS. *Bibr.*

PLATE XVIII.—Fig. 2.

*Lingua cordiformi; dentibus palatinis in lineâ transversâ interruptâ, inter nares posteriores positâ; tympano celato; dorso mammillato.*

This curious species has, I believe, only once before been found. A single specimen exists in the French Museum, which was brought from Buenos Ayres

by Mons. d'Orbigny, and which formed the subject of Mons. Bibron's description. Mr. Darwin's specimen was taken on the open plains at Monte Video.

Of the three species of this remarkable genus at present known, two are inhabitants of Africa, from whence they were brought by Delalande. As neither of them has as yet been figured, it was thought desirable that the present opportunity should be taken to exhibit some of the generic characters, and especially the hard horny spur on the hinder foot.

This genus is one of those bufonine forms of the *RANIDÆ* which irresistibly lead us to doubt the correctness of the present received arrangement of the anurous Amphibia.

GENUS—ALSODES. *Bell.*

Caput convexum. Lingua anticè acutè-producta, posticè rotundata, et libera. Dentes palatini inter nares posteriores. Tympanum celatum. Aperturæ Eustachianæ haud conspicuæ. Digiti anteriores ad basin tantum—posteriores usque ad phalangem tertium membranâ connexi.

A genus of the Raniform group, nearly allied, as Mons. Bibron observes, to *Scaphiopus*, by the structure of the hands, which, although without any projecting rudimentary thumb, has a small process under the skin, along the extreme margin of the first finger. In common with the genus *Bombinator*, it has the opening of the Eustachian tubes so small as scarcely to be detected.

ALSODES MONTICOLA. *Mih.*

PLATE XVIII.—Fig. 3.

DESCRIPTION.—Head semi-elliptical, somewhat convex, with the muzzle nearly perpendicular; vertex smooth. Eyes of moderate size. Nostrils very small, opening upwards. Tongue broad and rounded behind, narrowing to a point at the apex, detached at the posterior part. Palatine teeth in two small approximate patches, between the posterior nostrils. Openings of the Eustachian tubes scarcely visible. Extremities of moderate length. The fore feet, with four rather short toes, connected at the base by a short membrane; the inner toe broad, and with a slight projection under the skin, along its inner margin; hinder toes connected as far as the joint of the second and third phalanges.

The colour of the only specimen in the collection has become totally changed into a smoky brown by the spirit, but the following is Mr. Darwin's description

G



of it when living: "On the centre of the back a strong tinge of grass-green, shading on the sides into a yellowish brown; iris coppery."

## DIMENSIONS.

	In.	Lin.
Length of the head .....	0	5
of the body .....	1	0
of the anterior extremities .....	0	9
of the posterior extremities .....	1	8

Mr. Darwin found this species "in the island of Inchy, archipelago of Chonos, north part of Cape Tres Montes, from the same great height as *Bufo Chilensis* (from 500 to 2500 feet elevation) under a stone."

GENUS—LITORIA. *Bibr.*LITORIA GLANDULOSA. *Mihi.*

PLATE XVIII.—Fig. 4.

*Femoribus posticè glandulosis; digitis posticis breviter palmatis.*

This species agrees in many respects with *Litoria Americana* of Bibron. It differs, however, in the toes being much less palmate, at least according to the generic character given by that excellent naturalist, and in the existence of numerous thick glands on the posterior part of the thighs. The very slight degree to which the extremities of the toes are dilated in the other species of this genus, and which would at first sight lead to their allocation amongst the Raniform rather than the Hyliform group, is in the present species even more strongly exhibited; and it can scarcely be said that any dilatation exists at all.

The colours in the only specimen brought by Mr. Darwin are much obscured. The upper parts are apparently of an uniform brown, the under parts whitish, dotted with brown.

It was taken by Mr. Darwin at Concepcion, in Chile.

GENUS—BATRACHYLA. *Bell.*

Lingua suborbicularis, posticè libera. Dentes palatini in fasciculis binis obliquis inter nares posteriores dispositi. Tympanum distinctum, parvum, rotundum. Digi depressi, ad apicem paulò dilatati, truncati. Anteriores ad basin tantum —posteriores paulò plus palmati.

This genus, which considerably resembles *Hylodes*, is nevertheless sufficiently distinct from it, in the distribution of the palatine teeth, in the form of the dilatations of the toes, in the presence of a small palmar membrane, and some other points. One of the most remarkable of its characters is the form of the dilatation at the extremity of the toes; it is very small, transverse, truncated, and even a little emarginate; in this respect it must be considered as constituting a very near approach to the family of the RANIDÆ. We are unfortunately without any information as to the habits of the only known species which could throw any light upon its relations; but it is very clear that the dilatations of the toes are not such as to constitute it a true *tree-frog*, nor, on the other hand, are the connecting membranes of sufficient extent to give it the typical character of the swimming group of these animals.

BATRACHYLA LEPTOPUS. *Mihi.*

PLATE XVIII.—Fig. 5.

DESCRIPTION.—Head depressed, broad, rounded. Nostrils small, placed near together. Eyes large, opening considerably upwards. Tongue nearly round, the posterior part free for about one-third of its length. Palatine teeth placed in two small oval groups, placed obliquely, between the posterior nostrils, separated from each other by a considerable space. Tympanum small, nearly round. Limbs of moderate length. The toes on all the feet depressed, slender, the terminal dilatation very small, transverse, truncated; those of the fore feet connected at the base only, those of the hinder to the union of the first and second phalanges; of those of the fore feet the third is the longest, then the fourth, the second, and the first; of the hinder the fourth is the longest, then the third and fifth equal, then the second and the first. There are some minute scattered glands on the posterior part of the thighs.

The only specimen in Mr. Darwin's collection is in so bad a condition, that it is impossible to say with any certainty what is its natural colour. It is brown



above, with a lighter band across the head between the eyes, and there are traces of a longitudinal line down the back; the limbs are banded with brown and brownish yellow; the under parts are pale, dotted with brown.

## DIMENSIONS.

	In.	Lin.
Length of the head .....	0	5
of the body .....	1	0
of the anterior extremities .....	1	0
of the posterior extremities.....	2	1

Found by Mr. Darwin at Valdivia.

GENUS—HYLORINA. *Bell.*

Caput *subrotundum planum*. Linguae *magna circularis, posticè libera*. Dentes palatini *in lined transversâ, parum interruptâ, dispositi*. Tympanum *distinctum*. Digiti *subdepressi, ad apicem obtusi, haud expansi*; anteriores *ferè liberi*; posteriores *ad basin membranâ connexi, et marginati*. Femora *multò glandulosa*.

A genus nearly allied to *Hylodes*, from which, however, it may at once be distinguished by the palmure of the hinder toes—which in *Hylodes* are entirely free—and by the absence of even the slightest dilatation of their extremities; offering another example of an osculant form between the *HYLIDÆ* and the *RANIDÆ*.

HYLORINA SYLVATICA. *Mihi.*

## PLATE XIX.—FIG. 1.

DESCRIPTION.—Head broad, rounded, the anterior margin, from the nose to the lip, nearly perpendicular. Eyes large and prominent. Tympanum distinct, small, round. Tongue very large, circular, and entire, the posterior half free. Palatine teeth placed in a transverse line between the posterior nostrils, scarcely interrupted in the middle. Skin of the back rugose. Anterior feet with the toes long, rather slender, united at the base only by a very short membrane, with round subarticular tubercles, the apex rounded, but not presenting the slightest expansion. Hinder toes similarly formed, but with the connecting membrane more conspicuous, and extending along the sides of the toes nearly to the extremity. Thighs covered on the under and posterior surface with rather large and distinct glands.

The following is the description of the colouring, as given by Mr. Darwin from the living specimen. “Above fine grass green, mottled all over with copper colour, which nearly forms two longitudinal bands; beneath entirely of a lurid reddish lead colour. Iris brown.”

## DIMENSIONS.

	In.	Lin.
Length of the head .....	1	0
of the body .....	1	8
of the anterior extremities .....	2	1
of the posterior extremities .....	4	4

Found by Mr. Darwin in the Archipelago of Chonos (S. of Chiloe) in thick forests.

## GENUS—HYLA.

HYLA VAUTERII. *Bibr.*

## PLATE XIX. FIG. 2.

Lingua *subcordiformi, posticè emarginatâ*. Dentibus palatinis *in fasciculis binis ovalibus, subcontiguis*. Oculis *prominentibus*. Capite *tam lato quam longo*. Gula *bi-plicatâ*; *suprà levitèr—infrâ multum granulosa*. Dorsus *fusco-griseo, punctis, maculis et fasciis lateralibus nigris*.

*Hyla Vauterii*. Bibr. MS.

DESCRIPTION.—Head short, thick, the sides anteriorly converging towards a nearly right angle, the muzzle rounded. Tongue nearly cordate, posteriorly emarginate, free for about one-fourth of its length. Palatine teeth in two oval fasciculi, placed nearly transversely between the posterior nares, and almost contiguous. Eyes prominent. Tympanum circular, rather large. Body plump, the sides nearly parallel for two-thirds of its length. The skin nearly smooth, but covered with very small inconspicuous granulations over the whole upper surface, which are rather more obvious on the head. The throat, the belly, and the inferior surface of the thighs covered with large prominent granulations. Beneath the lower jaw the granulations are smaller, and the under surface of the limbs excepting the thighs is quite smooth. A small fold of skin over the tympanum passes backwards to the arm; and beneath the throat there are two considerable transverse folds, one of which is before and the other immediately behind the arms. Fore feet, with the palms covered with small granular tubercles, and a tubercle under the joints of the fingers, which are connected to about one-third of their length. Hinder legs longer than the head and body by the whole foot and tarsus. The soles tuberculated. Toes rather short, palmate to half their length.

COLOUR.—The whole of the upper parts are greyish brown, with a tinge of red, and minutely punctured with black. There are scattered spots of the latter colour on the back and sides, assuming somewhat of a longitudinal arrangement, and a broad blackish grey fascia extends



from the eye backwards to the arm, including the tympanum, and this fascia is bordered beneath by a white line. The thighs and legs are barred and spotted with black. The under parts are yellowish white, excepting under the lower jaw, where it is finely mottled with black and white.

I received the name of this species from Mons. Bibron, who had, I believe, applied it to specimens in the Paris Museum. It was taken by Mr. Darwin at Maldonado, lurking under a stone, and at Rio Janeiro on palm-trees.

## DIMENSIONS.

	In.	Lin.
Length of the head and body . . . . .	1	6
of anterior extremities . . . . .	0	9
of posterior extremities . . . . .	2	5

HYLA AGRESTIS. *Mihi.*

## PLATE XIX.—FIG. 3.

*Capite brevi. Oculis subprominentibus. Tympano mediocri circulari. Lingua subrotundâ, posticè liberâ, anticè angustatâ. Dentibus palatinis in fasciculis binis, paulò separatîs, ad marginem postico-interiorem narium posteriorum. Dorso granuloso. Gula plicatâ. Digitis anticis ad basin tantum, posticis usque ad phalanges penultimas palmatis. Suprà viridis, linea albâ laterali, femoribus posticè atque lateribus abdominis, albis, nigro-maculatis.*

Habitat, Maldonado, in grassy fields.

DESCRIPTION.—Head short, thick, the two sides of the muzzle approaching each other at a rather acute angle, rounded at the extremity. Eyes rather large and prominent. Tympanum circular, of moderate size, and very distinct. Tongue entire, rounded, and free behind, narrowed, and almost angular in front. Palatine teeth in two oval parcels separated by a very small interval, and placed on a line with the hinder margin of the *posterior nares*; the whole of the back covered with extremely small granules; a slight fold or elevation of the skin commencing above the posterior margin of the tympanum, and extending backwards just above the arm, in front of which it is met by a more considerable one which crosses the throat from side to side; the under parts covered with large granules; fore feet with the toes palmated only at the base; hinder ones palmated to four-fifths of the length.

The colour of this beautiful species is thus given by Mr. Darwin:—"Above emerald green, beneath white; a silvery white stripe bordered beneath with a very narrow black line, extends from the corner of the eye, along the side, to the

thigh; a smaller one at the corner of the mouth; the posterior surface of the hinder legs and the flanks marked with black spots. Iris gold coloured; tympanum brown."

## DIMENSIONS.

	In.	Lin.
Length of the head and body . . . . .	1	8
of the anterior extremities . . . . .	1	0
of the posterior extremities . . . . .	2	8

The young of this species, instead of the bright green colour of the upper parts, is of a delicate grey with small brown markings; and a lateral fascia of brown, bordered above and beneath with a white line, extends from the fore part of the head backwards, the upper white line nearly to the thigh, the inferior one to the shoulder. The black spots on the flanks and thighs are but just visible.

This species so nearly resembles the *Hyla pulchella* of Mons. Bibron, at least as far as his description enables me to ascertain its characters, that it was with some hesitation that I came to the conclusion that they are distinct. Exclusive, however, of the difference of colour, the back of the present species is granulated, and the throat still more distinctly so, whereas the other animal has the skin on the upper parts, as well as on the anterior part of the throat, quite smooth. The palatine teeth also appear to be somewhat differently arranged.

Mr. Darwin observes, that this species was found in numbers in the open grass plains, and likewise in swamps, about Maldonado, and that they can never ascend trees, as these are entirely wanting at the places frequented by the *Hylæ*.

## FAM.—BUFONIDÆ.

GENUS—RHINODERMA. *Bibr.*

*Lingua cordato-ovata, postice libera et subemarginata. Dentes palatini nulli. Tympanum celatum. Glandæ parotidæ nullæ. Digiti breves, depressi; anteriores ad basin tantum, posteriores ferè dimidio palmati. Rostrum cutis appendiculo filiformi instructum.*



RHINODERMA DARWINII. *Bibr.*

PLATE XX.—FIG. 1, 2.

*Suprà pallidè rufo-cinereum, fasciis transversis viridescentibus; subtus castaneo-nigrum, maculis albis.*

*Rhinoderma Darwinii.* Bibr. Hist. Nat. Rept. VIII. p. 659. *Var.* Dorso fuscescenti-nigro.

DESCRIPTION.—The head and body are flattened, the head triangular, slightly truncated in front, but appearing angular from the skin being produced into a small filiform appendage, standing forwards from the extremity of the snout. The eyes are lateral, slightly prominent. Body very slender. Skin perfectly smooth, and without apparent glands, excepting on the thighs. Fore legs rather short, reaching quite to the thighs when placed by the side; the toes almost wholly separate, there being but the rudiment of a connecting membrane at their base. Hinder legs long, extending forwards beyond the head by the whole length of the foot; the hinder toes are connected nearly half their length, and the connecting membrane is thick and coloured like the rest of the skin.

COLOUR.—The colour varies greatly in different individuals. The following are the principal variations in the specimens collected by Mr. Darwin. Above pale iron rust-colour, with a transverse fascia across the head, a triangular one over the shoulders, a large broad mark on the loins, and the upper part of the thighs all of a bright beautiful green. The under side anteriorly rich chestnut-brown, passing into black posteriorly, with several irregular snow-white spots, particularly a broad one across the belly, and white bands across the legs. Another specimen was cream colour above, the markings darker, and with small spots of green. In one the chestnut colour beneath was replaced by bright yellow. There is one, constituting a very distinct variety, in which the upper part is wholly and almost uniformly dark brown. The female is greenish grey above, without conspicuous markings.

This is the only known species of the genus, which was founded by Mons. Bibron upon the specimens collected by Mr. Darwin. The general slowness and elegance of its form, and its slender proportions, would lead us to consider it at first sight as rather belonging to the *Ranidæ* than the *Bufo*; but the total absence of teeth in the upper maxillary arch, shews that its proper place is in the latter group. Its form and the length of the posterior extremities would also prepare us to expect that it can leap freely, which Mr. Darwin states to be the fact. It inhabits thick and gloomy forests, and is excessively common in the forest of Valdivia.

## DIMENSIONS.

	In.	Lin.
Length of the head and body .....	1	0
of the anterior extremities .....	0	5
of the posterior extremities .....	1	4

BUFO CHILENSIS. *Bibr.*

Of this species, which has been described under different names by many naturalists, and the synonymy of which has only lately been cleared up by Mons. Bibron, there exist numerous specimens in the collection of Mr. Darwin, who found it at Buenos Ayres, and also in the Archipelago of Chonos, on the west coast of South America. It is certainly remarkable that the same species should be found on the opposite sides of the Continent; but on a careful examination I do not find any specific distinctions between the specimens from the different localities. The Prince de Wied has described it as found at Brazil, under the name of *Bufo cinctus*, and it is also well known as having been repeatedly procured in Peru and in Chile; but Mons. Bibron has in his work considered them all as belonging to but one species. The following account of its habits as given by Mr. Darwin is very curious and interesting:—"These Toads are exceedingly abundant all over the treeless damp mountains of granite, crawling about, and eating during the daytime, and making a noise similar to that which is commonly used in England to quicken horses. Many of them on being touched close their eyes, arch their back, and draw up their legs (as if the spinal marrow was divided), probably as an artifice. They are remarkable from their curious manner of *running* like the Natter Jack of England; they scarcely ever jump, neither do they crawl like a toad, but run very quickly. Their bright colours give them a very strange appearance. They abound at an elevation of 500 to 2500 feet."

## GENUS—PHRYNISCUS.

PHRYNISCUS NIGRICANS. *Weigm.*

PLATE XX.—FIG. 3, 4, 5.

*Dorso granuloso, scabriusculo. Pedibus posticis subpalmaris. Corpore membrisque nigris, abdomine maculâ magnâ transversâ ad partem posteriorem et maculâ rotundâ utrinque medium versus, palmis atque plantis, omnibus coccineis.*

*Phryniscus nigricans.* Weigm. Nov. Act. Leop. XVII. p. 264. Bibr. Hist. Rept. VIII. p. 723.

*Chauvus formosus.* Tschudi Classif. Batrach.

Habitat, Maldonado and Bahia Blanca.

H



This curious little species has been described by Weigman under the present name,—by Tschudi under the generic name of *Chaunus*, and fully by Bibron, who retained the name originally given to it by Weigman. It now remains only to correct, from Mr. Darwin's notes, some points respecting the colours, which had been mis-stated in consequence of the action of the spirit in which the specimen had been preserved. The colour of this curious miniature representation of a Toad, is "ink black," excepting the palms and soles of the feet, a large transverse spot across the posterior part of the abdomen, two smaller ones near the middle, and in some specimens a few scattered little spots, all of the most intense vermilion red. There is one specimen from Bahia Blanca which has also some small "buff-orange" spots on the upper part.\* Mr. Darwin observes that "the appearance of the vermilion colour is as if the animal had crawled over a newly painted board;" and he adds—"This Toad inhabits the most dry and sandy plains of Bahia Blanca, where there is no appearance of water ever lodging." The other specimens were taken at Maldonado, where it inhabits the sand-dunes near the coast. Mr. Darwin threw one into a pool of fresh-water, but he found it could hardly swim, and he thinks, if unassisted, it would have been soon drowned.

This species is diurnal in its habits, and may be daily seen under a scorching sun, crawling over the parched and loose sand. M. D'Orbigny brought specimens from Monte Video.

## DIMENSIONS.

	In.	Lin.
Length of the head and body .....	1	0
of the anterior extremities .....	0	5
of the posterior extremities.....	0	8

GENUS—UPERODON. *Bibr.*UPERODON ORNATUM. *Mihi.*

PLATE XX.—Fig. 6.

*Capite multò latiore quam longiore. Dorsò olivaceo, maculis fuscis, albo marginatis.*

Habitat Buenos Ayres.

DESCRIPTION.—Head more than half as broad again as it is long, and equal in breadth to half the entire length of the head and body. Muzzle rounded. Nostrils oval, opening upwards and a

\* This specimen from Bahia Blanca has a much smoother skin than the others; but from its similarity in all other characters there can be no doubt of its specific identity with them.

little outwards. Eyes rather large, the upper eyelids forming perfect flaps, which entirely cover the eyes. Body rounded, very broad. The shoulders and thighs wholly concealed by the skin of the body. Limbs very short. The anterior feet very broad. The toes somewhat depressed, very short, bordered with a fold of skin. Hinder feet with the toes more depressed and more distinctly bordered. Back covered with small glands.

COLOUR.—The colour of the upper surface is dark olive, becoming lighter at the sides, and having numerous dark brown spots, which are round, oval, elliptical, or irregular, of very various sizes, placed somewhat symmetrically, and each bordered with a whitish or yellow line. Beneath pale, excepting the throat, which is black.

I have ventured to consider this remarkable amphibian as specifically distinct from *U. marmoratum* of Bibron; a conclusion to which I have been almost imperatively led, by the fact of its inhabiting a different hemisphere from all known specimens of that species. The other was found by M. Leschenault in the interior of the peninsula of India: the specimen from which the present description is taken was obtained by Mr. Darwin at Buenos Ayres. Notwithstanding the similarity of the two species, which is so great as to have led Mons. Bibron to consider them as identical, I could not assent to such an anomaly as the existence of an animal, at once so rare and possessed of such limited powers of locomotion, in two regions so widely remote. I have not the opportunity of comparing the specimens of the former species with the present, but, even from Mons. Bibron's description, I believe that I can discover sufficient discrepancies between the animals, to bear me out in the view I have taken. These discrepancies I venture to place in the following tabular view, and leave zoologists to form their own conclusions.

## UPERODON MARMORATUM.

"La tête offre en arrière une largeur à peu près égale à son longueur totale, laquelle entre pour le quart environ dans l'étendue de l'animal."

"On pourrait considérer la peau comme étant parfaitement lisse, si l'on ne voyait éparses sur le dessus du tronc un certain nombre de verrues glanduleuses d'un assez grand diamètre relativement à la grosseur de l'animal, mais fort peu saillantes ou à peine convexes."

"Les parties supérieures de ce Batracien présentent sur un fond olivâtre, d'énormes tâches brunes, toutes confluentes, ou s'anastomosant diversement."\*

## UPERODON ORNATUM.

Head fully half as broad again as it is long, and equal in breadth to half the total length of the animal.

Back covered with numerous *small* glandular tubercles, notably elevated.

All the spots on the back are quite distinct, not in any way passing into each other or connected, and each encircled by a white line.

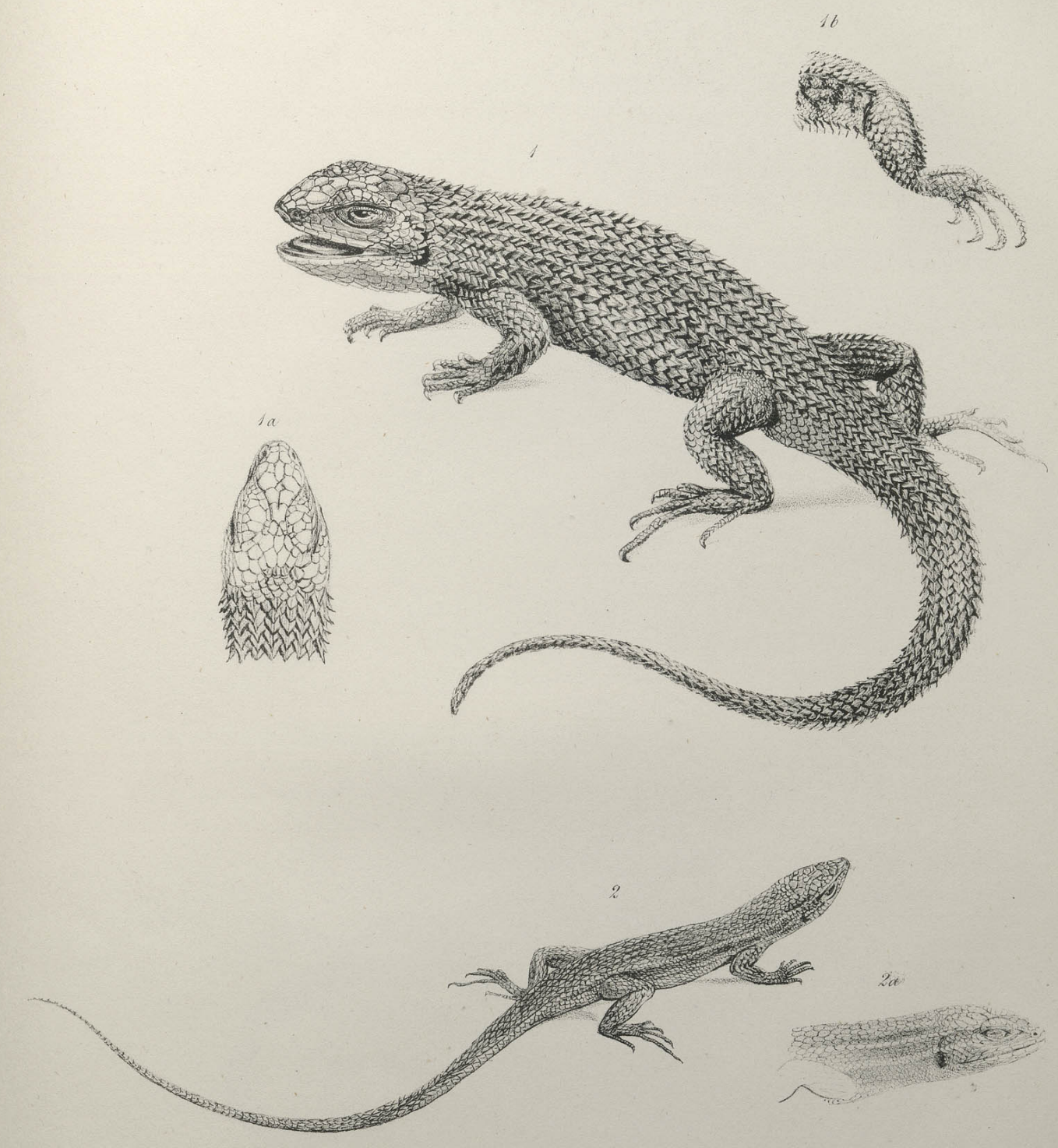
\* Bibr. Rept. VIII. p. 749.







Plate 1.



*Drawn from Nature by B. Waterhouse Hawkins,  
coloured in Lillie's C. F. B. and M. P. P.*

1. *Proctotretus chilensis* } Nat. Size.  
2. *gracilis* }  
1a. 1b. } Magnified Views.  
2a. }



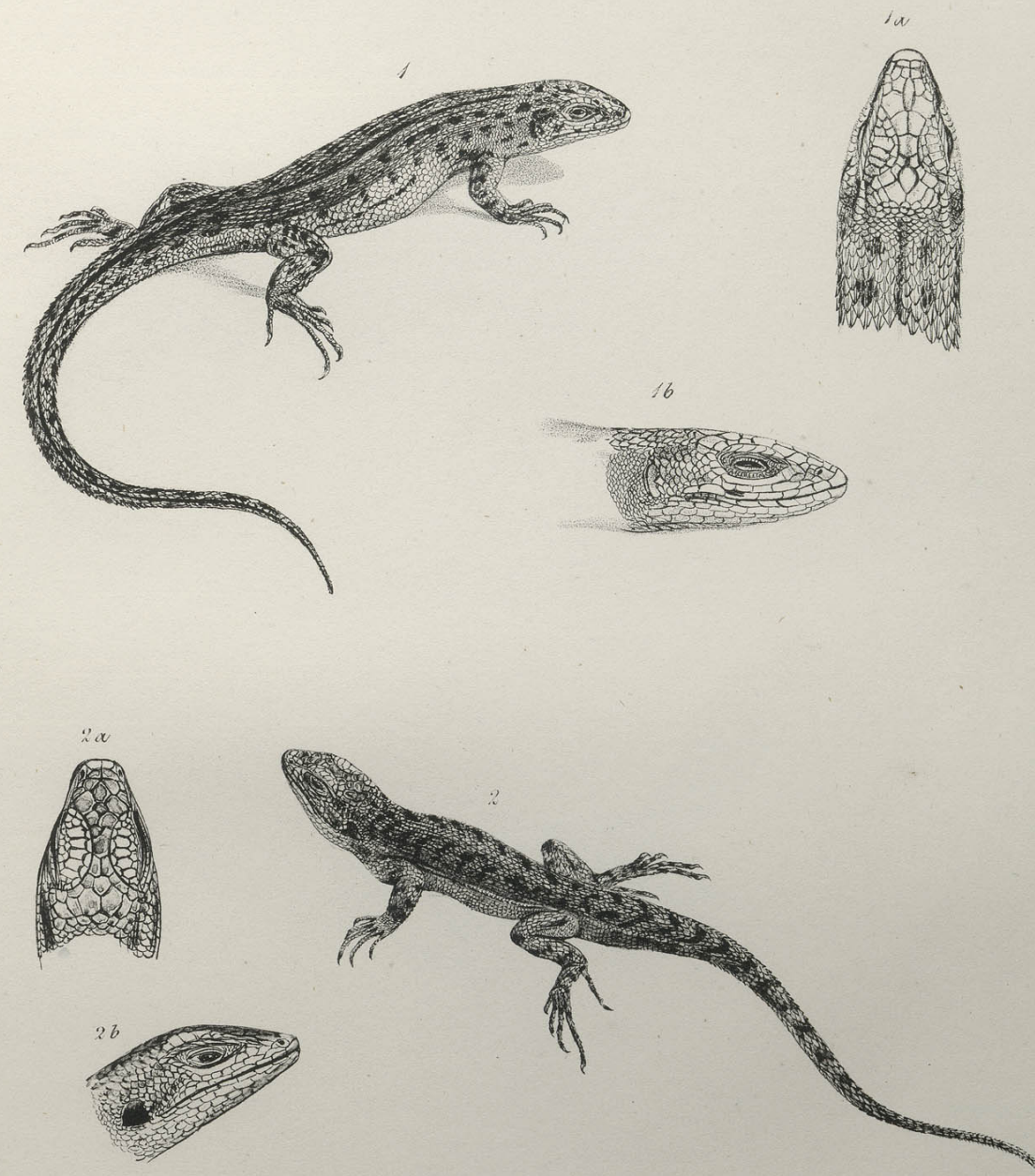


Drawn from Nature by B. Waterhouse Hawkins,  
on stone in Lithotype C. Hullmandel's Patent.

1. 2. *Proctotretus pictus*. Mac. Sise.



Plate 3.



From Nature by E. Waterhouse Hawkins.  
En Litho par C. Hustumandels Patent.

1. *Proctotretus Bibronii* | Nat. Size.  
2. *tenuis* |  
a & b. 1 & 2. Magnified Views of Heads.



Plate 4.



W. H. Edwards delin.

Printed by C. Hullmandel

1. *Proctotretus signifer*.  
2. .... *nigromaculatus*.  
2a. .... Magnified View.





From Nature by D. Waterhouse Hawkins.  
in Lithotype C. Hudson and Co. Patent.

- |                                    |              |
|------------------------------------|--------------|
| 1. <i>Proctotretus Fitzingerii</i> | } Nat. Size. |
| 2. <i>Cyanogaster</i>              |              |



Plate 6.

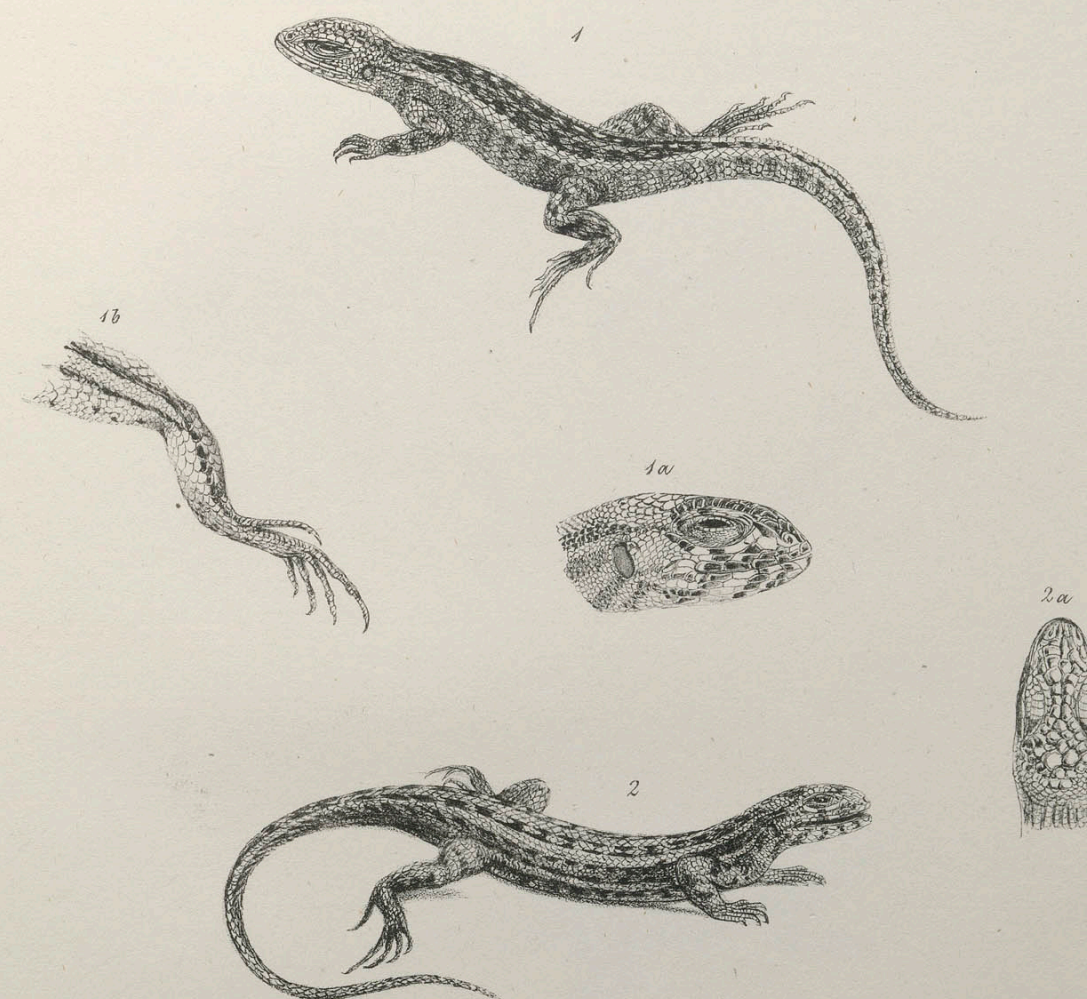


Drawn from Nature by E. Waterhouse Howland,  
on stone in lithotype C. H. Sturges & Co. New York.

<sup>1</sup> } *Proctotretus Kingii* MacS.  
<sup>2</sup> }  
a. b. Magnified 10x.



Plate 7.



From Nature by B. Waterhouse Hawkins,  
in Lilliput C. Hullmandel's Patent.

1 } *Proctotretus Darwinii*. Nat. size.  
2 }  
1 a & b } Magnified Views.  
2 a }



Plate 8.



*B. Waterhouse Hawkins del.*

1. } *Proctotriton Weymannii*  
2. }  
1a. } Magnified View.  
2a. }





Drawn from Nature by B. Waterhouse Hawkins,  
in stone on Lithostone & Gaultier's Patent.

- |                                     |                    |
|-------------------------------------|--------------------|
| 1. <i>Tropidurus multimaculatus</i> | } Nat. Size.       |
| 2. <i>pectinatus</i>                |                    |
| 1a. 1b.                             | } Magnified Views. |
| 2a.                                 |                    |



Plate 10.



From Nature by D. Waterhouse Howison.  
in Lithogr. C. B. Landels Patent

*Diplolamius Darwinii* Nod. Soc.



Plate 14.



E. Waterhouse Hawkins del.

Printed by G. Hallenandol.

*Diplolamys Bibronii* Nat. Size.



Reptiles. Plate 42.



Printed by Chiswick.

*Amblygobius Dumerilii*, nat. size.

Drawn from Nature in color by E. Mearns. London.





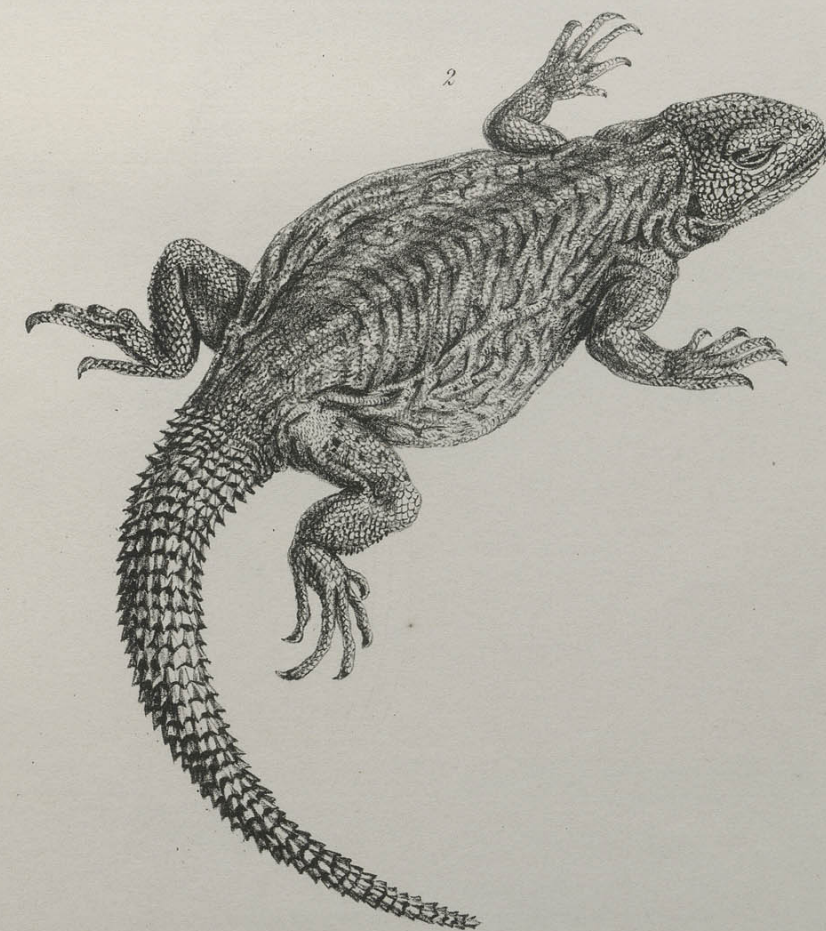
Drawn from Nature in 1840 by H. M. S. Beagle.

Printed by G. Hallman.

1. *Gymnodactylus* *Gardichauda*.
2. *Nautilius* *Grazi*.



Reptiles. Plate 14.

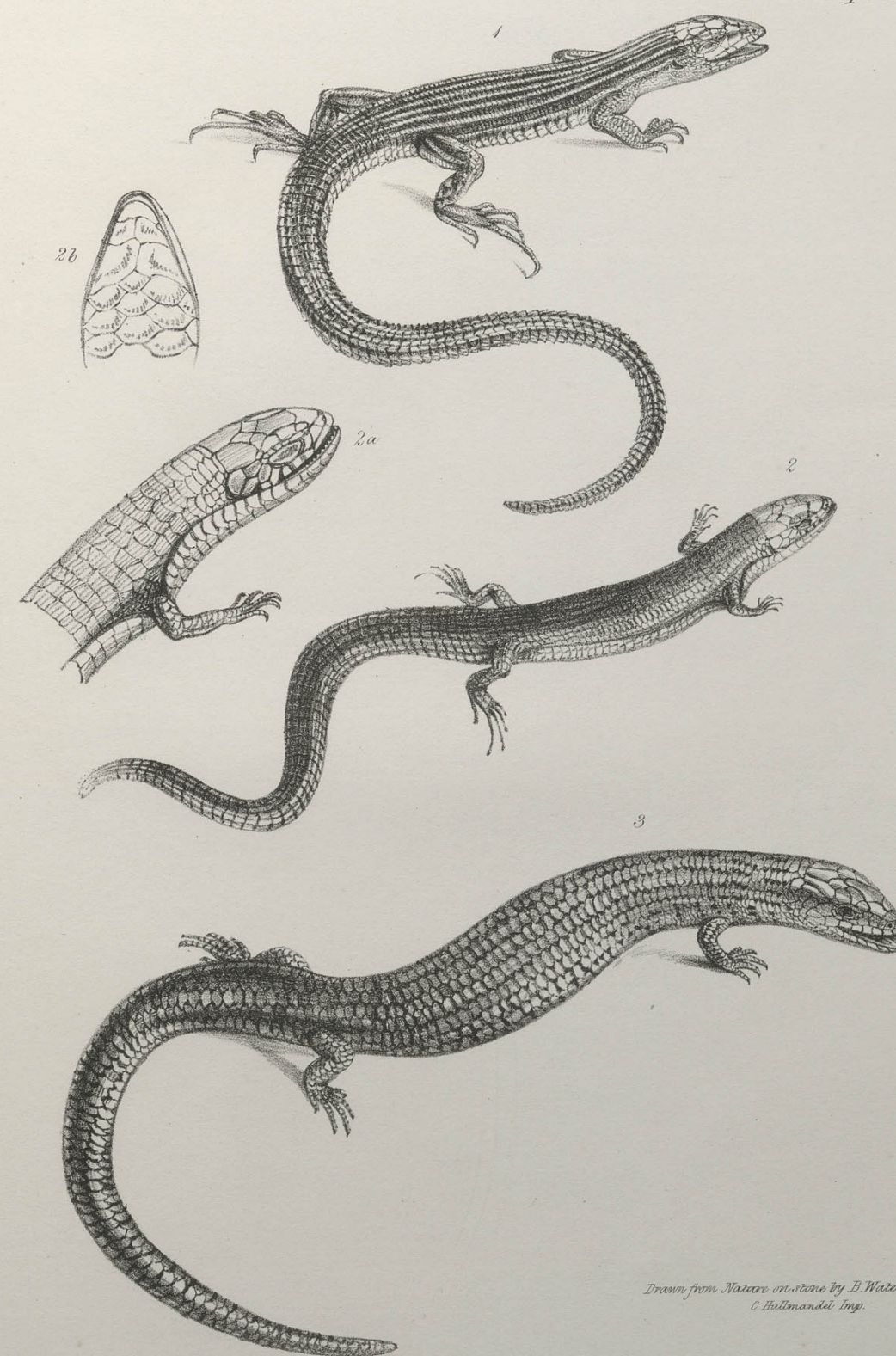


Drawn from Nature in Mexico by A. Macdonald.

Engraved by C. Macdonald.

1. *Leiocephalus Grayii*.
2. *Centrura flagellifer*.

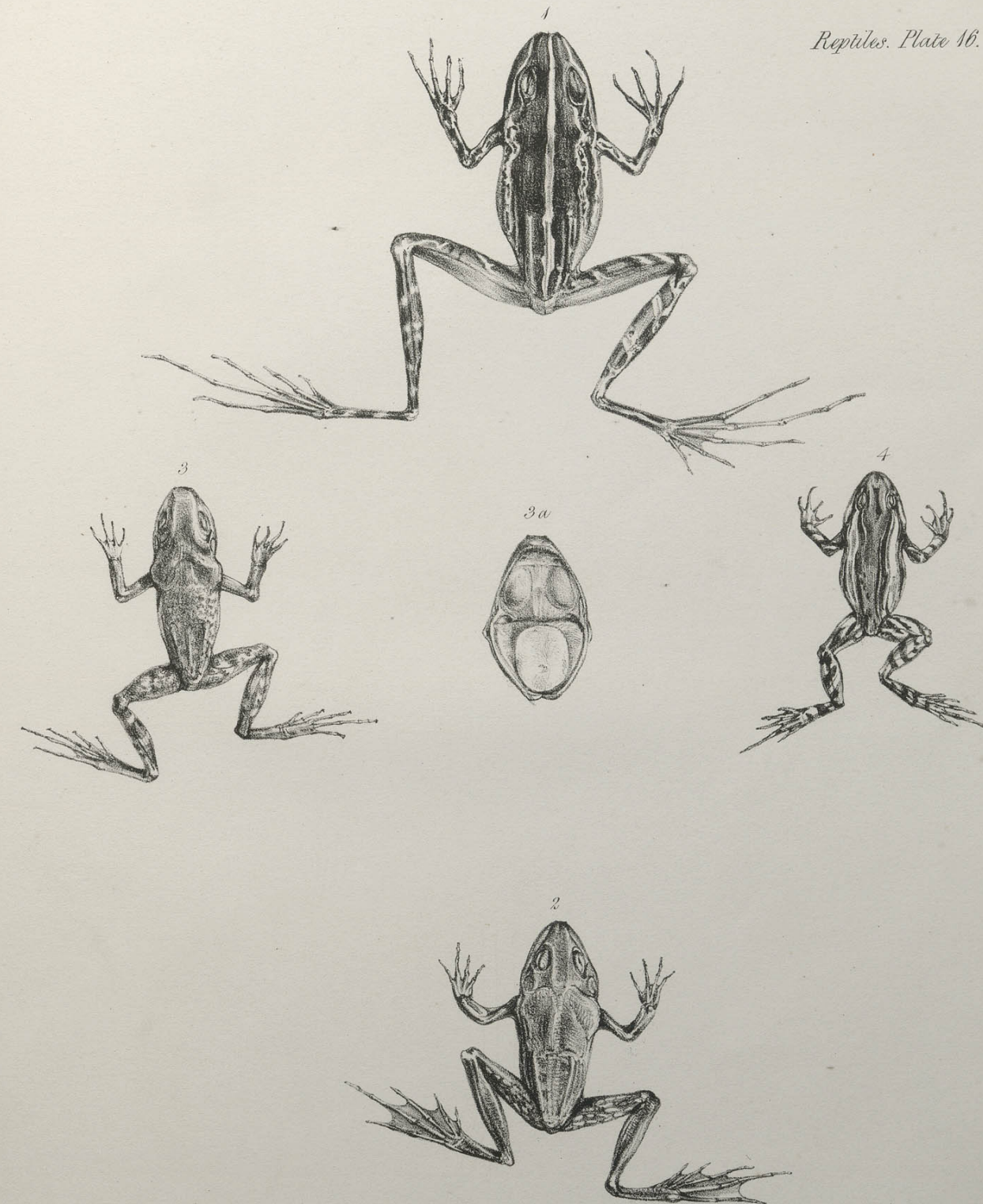




Drawn from Nature on Stone by H. Waterhouse Howland.  
C. H. Blandford, Imp.

- |            |                                     |              |
|------------|-------------------------------------|--------------|
| 1.         | <i>Ameiva longicauda.</i>           | } Nat. size. |
| 2. 2a. 2b. | <i>Gerrhonotus septentrionalis.</i> |              |
| 3.         | <i>Cyclodactylus casuarinae.</i>    |              |





Drawn from Nature on Stone by B. W. H. H. H. H. H.

C. G. H. H. H. H. H.

- |    |                                 |              |
|----|---------------------------------|--------------|
| 1. | <i>Rana Delalandii.</i>         | } Nat. Scie. |
| 2. | <i>Rana Mascariensis.</i>       |              |
| 3. | <i>Limnocharis fuscus.</i>      |              |
| 4. | <i>Cystignathus Georgianus.</i> |              |





Drawn from Nature on Stone by E. Waterhouse Hawkins

Printed by C. Hullmandel

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1. <i>Bombinator bibronii</i> . | } 1a. Mag. View of Tongue & Gullet. |
| 2. <i>Grayii</i> .              |                                     |
| 3. <i>Pleurodema Darwinii</i> . | } Nat. Size.                        |
| 4. <i>elegans</i> .             |                                     |
| 5. <i>bufoninum</i> .           |                                     |





Engraved from Nature on Stone by E. Hadenhamer, London.

C. H. Hadenhamer, Imp.

1. 1a. *Leuperus salarius.*  
 2. 2a. 2b. *Ptychocephalus Americanus.*  
 3. 3a. 3b. *Alvodes monticola.*  
 4. 4a. *Litoria glandulosa.*  
 5. 5a. 5b. *Batrachyla leptopus.*



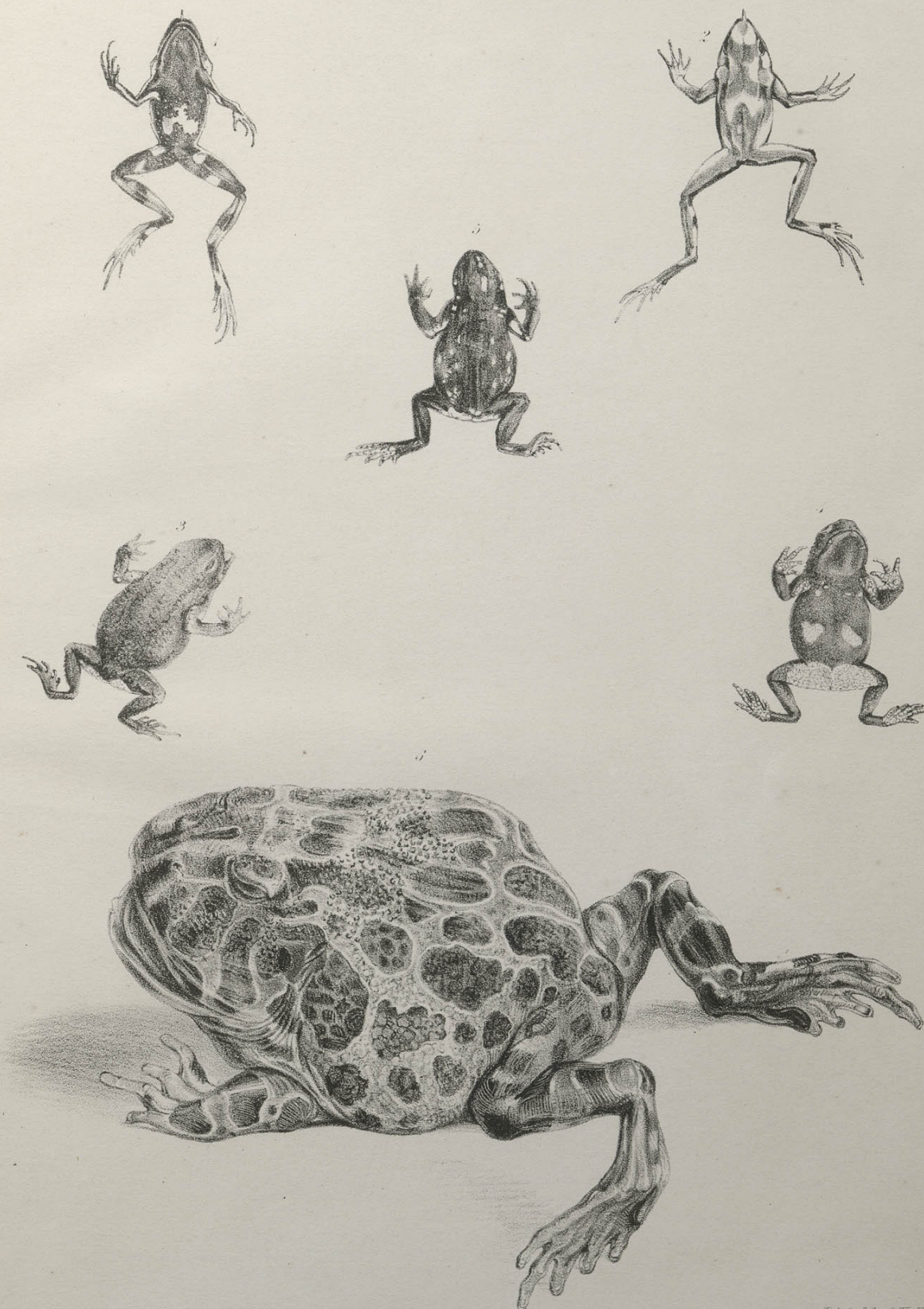


Drawn from Nature on stone by D. Waterhouse Howland.

A. H. M. and del. imp.

- 1. 1a. *Hyla sylvatica*.
- 2. 2a. *Hyla agrestis*.
- 3. 3a. *Hyla vanterii*.





Drawn from Nature on stone by E. Maclean & Co.

Printed by C. Bulmer & Co.

- |   |                     |
|---|---------------------|
| 1. 2. <i>Rhinoderma Darwini</i> .       | } <i>Succinea</i> . |
| 3. 4. 5. <i>Phrynosoma marmoratus</i> . |                     |
| 6. <i>Uperodon ornatum</i> .            |                     |



